

# **EXHIBIT 1**

**UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF CALIFORNIA**

IN RE FIBROGEN, INC., SECURITIES  
LITIGATION

Case No. 3:21-cv-02623-EMC

**EXPERT REPORT OF CHAD COFFMAN, CFA**

**January 27, 2023**

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## I. INTRODUCTION

1. I, Chad Coffman, am the President of Global Economics Group, a Chicago-based firm that specializes in the application of economics, finance, statistics, and valuation principles to questions that arise in a variety of contexts, including, as here, in the context of securities litigation. I have been asked by counsel for the Lead Plaintiffs in this matter to examine and opine on whether the markets for FibroGen, Inc. (“FibroGen” or the “Company”) publicly traded securities were efficient during the period from December 20, 2018 through July 15, 2021, inclusive (the “Class Period”).<sup>1</sup> The FibroGen publicly traded securities (collectively, “FibroGen Securities”) I have been asked to consider include FibroGen common stock (“FibroGen Common Stock” or “Common Stock”), and FibroGen put and call options (“FibroGen Options” or “Options”). In addition, I have been asked to opine on whether calculating damages in this action is subject to a common methodology under Section 10(b) of the Securities Exchange Act of 1934 (the “Exchange Act”) and SEC Rule 10b-5 adopted thereunder (collectively, “Section 10(b)”).

2. The materials I have considered in forming my opinions are summarized in **Appendix A**. Global Economics Group is being compensated at an hourly rate of \$900 per hour for my work on this matter, and at rates between \$230 and \$470 for members of my staff who performed work in connection with this report under my direction and supervision. My compensation is in no way contingent on the outcome of this case. My qualifications are described below.

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<sup>1</sup> Corrected Consolidated Class Action Complaint for Violation of the Federal Securities Laws filed November 19, 2021, *In Re FibroGen, Inc., Securities Litigation*, No. 3:21-cv-02623-EMC (“Complaint”) p. 1.

## II. QUALIFICATIONS

3. I hold a Bachelor's Degree in Economics with Honors from Knox College and a Master's of Public Policy from the University of Chicago. I am also a CFA charter-holder. The CFA, or Chartered Financial Analyst, designation is awarded to those who have sufficient practical experience and complete a rigorous series of three examinations over three years that cover a wide variety of financial topics including financial statement analysis and valuation.

4. I, along with several others, founded Global Economics Group on March 25, 2008.<sup>2</sup> Prior to starting Global Economics Group, I was employed by Chicago Partners LLC for over twelve years where I was responsible for conducting and managing analysis in a wide variety of areas including securities valuation and damages, labor discrimination, and antitrust. I have been engaged numerous times as a valuation expert both within and outside the litigation context. My experience in class action securities cases includes work for plaintiffs, defendants, D&O insurers, and a prominent mediator (Retired Judge Daniel Weinstein) to provide economic analysis and opinions in dozens of securities class actions as well as other matters. As a result of my involvement in these cases, much of my career has been spent analyzing and making inferences about how quickly and reliably, and to what degree, new information impacts securities prices.

5. My qualifications are further detailed in my curriculum vitae, which is attached as **Appendix B.**

## III. SUMMARY OF OPINIONS

6. After analyzing FibroGen's Common Stock during the Class Period and giving careful consideration to the efficiency factors described in detail throughout this report, I have

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<sup>2</sup> Prior to March 16, 2011, Global Economics Group was known as Winnemac Consulting, LLC.

formed the opinion that the markets for FibroGen Common Stock and FibroGen Call and Put Options were efficient during the Class Period.

7. I have also formed the opinion that damages in this action can be calculated on a class-wide basis using a common methodology for FibroGen Securities. These opinions are based upon my analysis described below.

8. The remainder of this report is organized as follows: **Section IV** of this report provides an overview of FibroGen's business operations and the allegations in this case. **Section V** discusses the reliance requirement for the claims under Section 10(b) of the Exchange Act and the "fraud on the market" theory. **Section VI** introduces the *Cammer* factors and other factors that financial economists and courts apply when evaluating market efficiency under the "fraud on the market" theory. **Section VII** provides the results of my empirical evaluation of each *Cammer* factor and other factors for FibroGen's Common Stock during the Class Period. **Section VIII** analyzes market efficiency for FibroGen Options. **Section IX** addresses how damages in this matter are subject to a common approach and methodology that can be applied class-wide for all relevant securities. Finally, **Section X** offers my conclusions.

9. I reserve the right to amend this report, including to reflect new information that becomes available to me in light of the discovery process and/or future rulings from the Court.

#### **IV. OVERVIEW OF THE COMPANY AND ALLEGATIONS**

10. FibroGen is a biopharmaceutical company whose principal drug, Roxadustat, is an experimental pill designed to treat anemia in patients with chronic kidney disease.<sup>3</sup> In its public securities filings, FibroGen described its business during the Class Period as follows:

We are a leading biopharmaceutical company discovering, developing and commercializing a pipeline of first-in-class therapeutics. We apply our

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<sup>3</sup> Complaint ¶4.

pioneering expertise in hypoxia-inducible factor (“HIF”) and connective tissue growth factor (“CTGF”) biology to advance innovative medicines for the treatment of anemia, fibrotic disease, and cancer.<sup>4</sup>

11. For the fiscal year ended December 2020, FibroGen reported revenue of \$176.3 million, operating costs and expenses of \$368.2 million, and a net loss of \$189.3 million.<sup>5</sup> As of January 31, 2020, FibroGen employed approximately 531 employees<sup>6</sup> and its Common Stock traded on the NASDAQ Global Select Market under the ticker “FGEN.”<sup>7</sup>

12. The Complaint alleges that FibroGen and the Individual Defendants (as defined in the Complaint)<sup>8</sup> issued false and misleading statements and omitted material information during the Class Period, ultimately causing damages to purchasers of FibroGen Common Stock and Options who unknowingly bought FibroGen Securities at artificially inflated prices and were damaged when the price of those securities ultimately reflected the concealed information.<sup>9</sup>

13. More specifically, the Complaint alleges that throughout the Class Period, FibroGen falsely represented the safety and efficacy data of its drug, Roxadustat, and falsely assured investors that the safety data was derived pursuant to FDA-sanctioned analysis. For FibroGen to obtain the FDA’s approval for Roxadustat, it needed to demonstrate, through Phase 3 clinical trial data, that Roxadustat was at least as effective as EpoGen, the current standard of care for dialysis-dependent patients, while avoiding safety issues that prevented EpoGen from being widely used.<sup>10</sup> On December 20, 2018, FibroGen issued a press release announcing “Positive

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<sup>4</sup> FibroGen SEC Form 10-K for the fiscal year ended December 31, 2019, p. 3.

<sup>5</sup> FibroGen SEC Form 10-K for the fiscal year ended December 31, 2020, p. 91.

<sup>6</sup> FibroGen SEC Form 10-K for the fiscal year ended December 31, 2019, p. 45.

<sup>7</sup> FibroGen SEC Form 10-K for the fiscal year ended December 31, 2020, p.1.

<sup>8</sup> Complaint ¶2.

<sup>9</sup> Complaint ¶71.

<sup>10</sup> Complaint ¶3.

Topline Results from Three Global Phase 3 Trials of Roxadustat,” in which the Company stated that preliminary Phase 3 data had shown that Roxadustat was superior to Epogen.<sup>11</sup> Throughout the Class Period, Plaintiffs allege that FibroGen and the Individual Defendants repeatedly asserted that Roxadustat’s Phase 3 trial results showed that the drug was superior to Epogen and even safer than a placebo, which made FDA approval highly compelling.<sup>12</sup> The Complaint alleges that ultimately through a series of corrective disclosures, the market eventually learned the truth—that Defendants had intentionally manipulated the trial data it presented to investors and the FDA, making improper *post hoc* changes to its analyses after the data had been fully unblinded, to make Roxadustat appear better and safer than it was, and to conceal its serious safety risks.<sup>13</sup> Once revealed, the price of FibroGen Securities fell, harming investors who bought at inflated prices.<sup>14</sup>

## V. DISCUSSION OF RELIANCE ELEMENT

14. Class members’ reliance on the alleged misstatements and material omissions is a required element for Lead Plaintiffs’ Section 10(b) claims. Lead Plaintiffs assert the fraud on the market theory of reliance in this matter.<sup>15</sup> The “fraud on the market” theory is based on the fact that in an efficient market (one in which widely-available public information is quickly incorporated into the market price of a security), all purchasers implicitly rely on any material misrepresentations or omissions since the value of those misrepresentations or omissions is

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<sup>11</sup> Complaint ¶51, “FibroGen Announces Positive Topline Results from Three Global Phase 3 Trials of Roxadustat for Treatment of Anemia in Patients with Chronic Kidney Disease,” GlobeNewswire, December 20, 2018.

<sup>12</sup> Complaint ¶5.

<sup>13</sup> Complaint ¶58.

<sup>14</sup> Complaint Section V.F.

<sup>15</sup> Complaint Sections V & VI.

incorporated into each class member's purchase price. The "fraud on the market" theory was first addressed by the U.S. Supreme Court in *Basic Inc. v. Levinson*:

... [I]n an open and developed securities market, the price of a company's stock is determined by the available material information regarding the company and its business...Misleading statements will therefore defraud purchasers of stock even if the purchasers do not directly rely on the misstatements...The causal connection between the defendants' fraud and the plaintiffs' purchase of stock in such a case is no less significant than in a case of direct reliance on misrepresentations.<sup>16</sup>

15. The Supreme Court reaffirmed this theory in *Halliburton II*:

More than 25 years ago, we held that plaintiffs could satisfy the reliance element of the Rule 10b-5 cause of action by invoking a presumption that a public, material misrepresentation will distort the price of stock traded in an efficient market, and that anyone who purchases the stock at the market price may be considered to have done so in reliance on the misrepresentation. We adhere to that decision and decline to modify the prerequisites for invoking the presumption of reliance.<sup>17</sup>

16. As stated in *Basic* and reaffirmed in *Halliburton II*, in an open, developed and efficient market, market prices reflect what is publicly known about a company. If a company provides the market with misleading information regarding its financial strength or business practices, the market price will be distorted (i.e., inflated or deflated) compared to what the price would have been if the truth were known (but-for misleading information). Thus, in an efficient market, where the plaintiff asserts there were material misrepresentations or omissions, all purchasers implicitly relied on those misrepresentations and/or lack of disclosure by paying the distorted price.

17. It is an empirical exercise to determine whether the market for a security was "open and developed" or "efficient" to the degree required for a presumption of reliance under the

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<sup>16</sup> *Basic Inc. v. Levinson*, 485 U.S. 224, 241-42 (1988) ("Basic").

<sup>17</sup> *Halliburton Co. v. Erica P. John Fund, Inc.*, 134 S. Ct. 2398, 2418 (2014) ("Halliburton II").

“fraud on the market” theory.<sup>18</sup> The esteemed economist Dr. Eugene Fama, in his seminal research, first outlined definitions of an “efficient market.”<sup>19</sup> He described different levels of efficiency which he called “weak-form,” “semi-strong-form,” and “strong-form” efficiency.<sup>20</sup>

18. The market efficiency standard adopted by *Basic* and reaffirmed by *Halliburton II* as necessary for the presumption of reliance conforms most closely with Dr. Fama’s “semi-strong form” efficiency. “Semi-strong form” efficiency implies that all publicly available information is reflected in a security’s current market price. This implies that security prices adjust to new publicly available information rapidly and in an unbiased fashion so that it is impossible to earn excess returns by trading on that information. *Basic* stated: “In an open and developed securities market, the price of a company’s stock is determined by the available material information regarding the company and its business.”<sup>21</sup> The Supreme Court’s effective adoption of the “semi-strong form” efficiency standard is economically sensible because it recognizes that insiders often possess non-public information and that securities prices do not necessarily reflect this non-public information, but that to presume reliance, the market price must reflect publicly available information.

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<sup>18</sup> To recognize the presumption of reliance, the *Basic* Court explained, was not “conclusively to adopt any particular theory of how quickly and completely publicly available information is reflected in market price.” *Basic*, 485 U.S. at 248 n.28. The *Basic* Court instead based the presumption on the fairly modest premise that “market professionals generally consider most publicly announced material statements about companies, thereby affecting stock market prices.” *Id.*, 485 U.S. at 246 n.24. *Basic*’s presumption of reliance thus does not rest on a “binary” view of market efficiency, but rather, market efficiency is a matter of degree.

<sup>19</sup> Eugene F. Fama, Efficient Capital Markets: A Review of Theory and Empirical Work, 25 J. FIN. 383 (1970).

<sup>20</sup> “Weak-form” efficiency requires that historical prices are not predictive of future prices. Under this form of efficiency, excess returns cannot be earned using strategies based on historical prices. Therefore, technical analysis will not produce consistent excess returns over time. “Semi-strong form” efficiency implies that all public information is reflected in a stock’s current market price. Security prices adjust to new publicly available information rapidly and in an unbiased fashion so that it is impossible to earn excess returns by trading on that information. Under this form of efficiency, neither fundamental nor technical analysis can produce consistent excess returns. “Strong-form” efficiency implies all information in the market, whether public or private, is accounted for in the market price. In this market, investors cannot consistently earn excess returns over a long period of time even if they have inside information.

<sup>21</sup> *Basic*, 485 U.S. at 241.

19. In the next section, I explain the factors that are regularly considered by financial economists and courts in determining whether the market for a particular security is efficient.

## VI. **CAMMER FACTORS**

20. In *Cammer v. Bloom*, the court identified the following factors as relevant to the determination of whether an efficient market exists for a given security: 1) average weekly trading volume, 2) analyst coverage, 3) market makers, 4) SEC Form S-3 eligibility, and 5) price reaction to unexpected information.<sup>22</sup>

21. The *Cammer* decision relied on Bromberg & Lowenfels' definition of efficiency. As articulated below, the adopted definition of efficiency is consistent with Fama's definition of "semi-strong" efficiency. For the purposes of this exercise, I adopt Bromberg & Lowenfels' definitions for the terms "open," "developed," and "efficient" as described below:

An *open market* is one in which anyone, or at least a large number of persons, can buy or sell.

A *developed market* is one which has a relatively high level of activity and frequency, and for which trading information (e.g., price and volume) is widely available. It is principally a secondary market in outstanding securities. It usually, but not necessarily, has continuity and liquidity (the ability to absorb a reasonable amount of trading with relatively small price changes).

An *efficient market* is one which rapidly reflects new information in price.

These terms are cumulative in the sense that a developed market will almost always be an open one. And an efficient market will almost invariably be a developed one.<sup>23</sup>

22. While there is a well-accepted economic theory of market efficiency, there are no broadly accepted bright-line empirical tests that allow one to classify a particular market as

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<sup>22</sup> *Cammer, v. Bloom*, 711 F. Supp. 1264 (D.N.J. 1989) ("Cammer").

<sup>23</sup> *Cammer*, 711 F. Supp. at 1276 n.17 (citing Bromberg & Lowenfels, 4 *Securities Fraud and Commodities Fraud*, § 8.6 (Aug. 1988) ("Bromberg & Lowenfels")) (emphasis added).

“efficient” or “inefficient.” The *Cammer* decision identified important metrics to consider when evaluating efficiency for purposes of the “fraud on the market” theory. I also consider a number of other factors that courts have utilized beyond the *Cammer* factors. However, since there are no bright-line tests for efficiency, it is important to consider the identified efficiency factors as a whole because none of the individual tests or metrics is determinative as to whether a particular market is efficient.

23. In the subsequent sections, I evaluate the market for FibroGen Common Stock during the Class Period under each of the *Cammer* factors, as well as the following additional factors that courts have also considered in assessing market efficiency: 1) market capitalization, 2) bid-ask spread, 3) percentage of stock not held by insiders (the float); 4) the fraction of shares held by institutional investors, 5) autocorrelation (meaning whether there is a pattern in a security’s returns so that future returns can be predicted based upon past returns), and 6) options trading. The first three of these additional factors are known as the “*Krogman*” factors, per the court’s decision in *Krogman v. Sterritt*, 202 F.R.D. 467 (N.D. Tex. 2001).

## **VII. APPLICATION OF EFFICIENCY FACTORS TO FIBROGEN COMMON STOCK**

### **A. OVERVIEW**

24. After giving careful consideration to each of the efficiency factors described in detail below, I find that each factor supports the conclusion that the market for FibroGen Common Stock was efficient throughout the Class Period. In addition to the discussion below, **Exhibit 1** summarizes how, for each of the factors examined, the empirical evidence supports a finding that FibroGen Common Stock traded in an efficient market. As further background to my analyses, **Exhibit 2** displays FibroGen Common Stock closing price and trading volume for each day throughout the Class Period.

25. In summary, and as discussed more fully below, FibroGen Common Stock traded in an efficient market during the Class Period. First, the average weekly trading volume of FibroGen Common Stock during the Class Period far exceeded benchmarks that courts have established when analyzing market efficiency. During the Class Period, the average weekly trading volume for FibroGen Common Stock was 4.14 million shares, which represents 4.65% of shares outstanding, higher than the average security traded on the New York Stock Exchange (“NYSE”) and/or the NASDAQ Exchange. Second, there were numerous securities analysts following and reporting on FibroGen during the Class Period. Third, FibroGen Common Stock was actively traded on the NASDAQ and there were more than 100 market makers during the Class Period. Fourth, FibroGen filed Form S-3ASRs before, during, and after the Class Period and met the important eligibility criteria for filing a Form S-3 throughout the Class Period. Fifth, there was a strong cause-and-effect relationship between new Company-specific information and the market price of FibroGen Common Stock during the Class Period. Sixth, FibroGen Common Stock had a large market capitalization relative to all other firms that traded on the NASDAQ and NYSE. Seventh, FibroGen Common Stock had a low bid-ask spread relative to other exchange-traded common stocks. Eighth, institutions, which are considered generally to be well-informed investors, held the vast majority of the public float of FibroGen Common Stock during the quarters of interest, while insiders, on average, held only approximately 8.26% of the shares outstanding. Ninth, there was no evidence of statistically significant autocorrelation during the Class Period. Finally, there was active trading in FibroGen options throughout the Class Period. My analyses of all of these factors support the conclusion that FibroGen Common Stock traded in an open, developed, and efficient market throughout the Class Period.

## B. CAMMER FACTOR 1: AVERAGE WEEKLY TRADING VOLUME

26. The first *Cammer* factor is the average weekly trading volume of a security.

According to one authority cited by the *Cammer* court,

Turnover measured by average weekly trading of 2% or more of the outstanding shares would justify a strong presumption that the market for the security is an efficient one; 1% would justify a substantial presumption.<sup>24</sup>

27. Volume as a fraction of shares outstanding is an important indicator of market efficiency. First, volume is objectively quantifiable and comparable across securities. Second, high volume is generally indicative of continuity, liquidity, and market depth – which are highly indicative of market efficiency.<sup>25</sup> Third, substantial volume would indicate there is likely a market for the collection and distribution of information about the security. As Professors Thomas and Cotter explain, “[t]rading volume was also considered as an eligibility standard because it affects information dissemination to the market, and was an important criterion for investment analysts in deciding which stocks to follow.”<sup>26</sup>

28. FibroGen Common Stock easily surpasses the threshold level of average weekly trading volume necessary for an efficient market. The average weekly trading volume for

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<sup>24</sup> *Cammer*, 711 F. Supp. at 1293 (citing Bromberg & Lowenfels).

<sup>25</sup> Continuity means that trades may occur at any time. Liquidity in this context means that investors can convert cash into shares or shares into cash at a price similar to that of the prior trade (assuming no new information). William Sharpe, Gordon J. Alexander & Jeffrey W. Bailey, *Investments*, Prentice Hall, 44-45 (5th ed. 1995).

Bromberg and Lowenfels define a market that has continuity and liquidity as “the ability to absorb a reasonable amount of trading with relatively small price changes.” *Cammer*, 711 F. Supp. at 1276 n.17 (citing Bromberg & Lowenfels).

Market depth refers to “the number of shares that [can] be traded at the quoted bid and ask prices.” A deep market will have significant orders on the buy and sell side so that the market can experience a relatively large market order without greatly altering the market price. See Amihud, Y., et al., *Liquidity and Asset Prices*, 1 FOUND. & TRENDS FIN. 269 (2005), 317.

<sup>26</sup> Randall S. Thomas & James F. Cotter, *Measuring Securities Market Efficiency in the Regulatory Setting*. 63 LAW & CONTEMP. PROBS. 105, 108 (2000). Randall S. Thomas is a Director of the Law and Business Program at Vanderbilt University. Dr. James Cotter was an Associate Professor of Finance at Wake Forest University.

FibroGen Common Stock during the Class Period was 4.65% of shares outstanding, compared to 2.49% for the NASDAQ and NYSE exchanges. Based on this figure, the weekly trading volume for FibroGen Common Stock far exceeds the 1% or 2% threshold cited by *Cammer*.<sup>27</sup> **Exhibit 3** plots FibroGen Common Stock’s trading volume as a fraction of shares outstanding for each week during the Class Period.<sup>28</sup> Indeed, the average weekly trading volume for FibroGen Common Stock during the Class Period was 4.14 million shares. This volume of trading supports the conclusion that the market for this security was efficient throughout the Class Period.

29. Another way to measure trading volume is annualized turnover velocity, which is essentially the first *Cammer* factor expressed in dollar terms.<sup>29</sup> To be more specific, instead of looking at shares traded divided by shares outstanding, turnover velocity is the dollar value of shares traded (i.e., shares traded multiplied by price per share) divided by the dollar value of all shares outstanding (i.e., shares outstanding multiplied by price per share). This is the same ratio because the numerator and denominator are multiplied by price per share. The advantage of this measure is that once quoted in annualized terms, FibroGen’s Common Stock’s turnover velocity can be compared directly with other publicly traded stocks based on exchange-reported statistics.

30. Over the Class Period, the annualized turnover velocity ratio for FibroGen’s Common Stock was 232% compared with the NASDAQ and NYSE average of 130% for the Class Period.<sup>30</sup> Thus, FibroGen Common Stock had an average annualized turnover that was

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<sup>27</sup> *Cammer* 711 F. Supp. at 1293-94.

<sup>28</sup> For the purposes of this analysis, a “trading week” consists of 5 consecutive trading days, which may not follow the calendar week.

<sup>29</sup> Turnover velocity is simply the average trading volume as a percentage of shares outstanding (the first *Cammer* Factor) expressed in dollar terms:

**Turnover Velocity Ratio** = (Volume x Price)/(Shares Outstanding x Price) = Dollars Traded/Dollars Outstanding.

<sup>30</sup> Turnover velocity for the NYSE and NASDAQ is calculated from data provided by the World Federation of Exchanges. See <https://www.world-exchanges.org/home/index.php/statistics/monthly-reports>.

substantially higher than the average stock trading on the NASDAQ and NYSE, further supporting that it traded in an efficient market.

31. In short, the relatively high trading volume in FibroGen Common Stock throughout the Class Period supports the conclusion that the market for FibroGen Common Stock was efficient.

### **C. CAMMER FACTOR 2: ANALYST COVERAGE**

32. The *Cammer* decision stated the following related to analyst coverage:

... [I]t would be persuasive to allege a significant number of securities analysts followed and reported on a company's stock during the class period. The existence of such analysts would imply, for example, the [auditor] reports were closely reviewed by investment professionals, who would in turn make buy/sell recommendations to client investors.<sup>31</sup>

33. Analyst coverage can be important evidence of efficiency. Significant analyst coverage implies that there is sufficient interest in a company and its securities, that there is an active market for information regarding the company and its securities, and that the information is widely distributed.

34. During the Class Period, there was abundant analyst coverage for FibroGen.

**Exhibit 4** shows that there were at least 111 reports issued during the Class Period and lists 8 separate firms that had equity analysts issue reports on FibroGen, including major firms such as Jefferies LLC, Mizuho, and Raymond James & Associates.<sup>32</sup> These reports served the purpose of disseminating publicly available information along with commentary, news, updates, analyses, and recommendations of the analysts to investors. The extensive coverage of FibroGen by

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<sup>31</sup> *Cammer*, 711 F. Supp. at 1286.

<sup>32</sup> I obtained FibroGen analyst reports from Seeking Alpha and from Plaintiffs' Counsel. The number of analyst reports I identify is likely understated since many are not available through third party data providers.

securities analysts supports the conclusion that FibroGen Common Stock traded in an efficient market throughout the Class Period.

35. Since 1989, when the *Cammer* decision was issued, there has been a significant increase in alternative methods by which publicly available information about publicly-traded securities is disseminated to investors. For example, since the *Cammer* decision, through the Internet, 24-hour cable news networks, email, RSS feeds,<sup>33</sup> and other media, the ability of individual and institutional investors to obtain information about publicly-traded securities and the market in general has revolutionized the manner in which investors and investment professionals receive and process information.

36. Moreover, information regarding the market price, the current bid-ask spread, and the ability to trade online is available almost instantaneously via the Internet for anyone with an online brokerage account. Thus, in addition to the substantial analyst coverage of FibroGen, there were many other sources of public information dissemination. For example, there was substantial public press regarding FibroGen. A search for articles classified as related to FibroGen or the drugs in FibroGen's pipeline (Roxadustat and Pamrevlumab) by Factiva over the Class Period resulted in 1,479 unique articles.<sup>34</sup> In addition, there were numerous SEC filings

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<sup>33</sup> RSS is an acronym for Really Simple Syndication or Rich Site Summary. RSS files are formed as XML files and are designed to provide content summaries of news, blogs, forums or website content. The RSS feeds are generally simple headlines and brief descriptions; if the user is interested, the user can click to see additional information. Content viewed in the RSS reader or news aggregator is known as an RSS feed. RSS is becoming increasing popular since it is a free and easy way to promote a site and its content without the need to advertise or create complicated content sharing partnerships (*see* <http://www.rss-specifications.com/>, and <http://www.rss-specifications.com/what-is-rss.htm>).

<sup>34</sup> Factiva is a business information and research tool owned by Dow Jones & Company. Factiva aggregates content from both licensed and free sources, and provides organizations with search, alerting, dissemination, and other information management capabilities. I first identified 1,479 unique articles as a result of two searches: 1) one search for "All Sources" with the company tag "Fibrogen Inc" and 2) a separate search for "Major News and Business Sources" with keyword fields "Roxadustat" or "Pamrevlumab" or "FibroGen" but excluding news with the company tag "Fibrogen Inc". Both searches were conducted for the period "December 20, 2018 – July 15, 2021". Articles entitled "NASDAQ New 52-week Highs and Lows" were removed from both searches. Duplicate articles

available online at the SEC EDGAR search database at no cost, as well as various other sources of public information available throughout the Class Period that I do not attempt to quantify. The degree of news coverage and publicly available information further supports the conclusion that there was substantial supply of, and demand for, information regarding FibroGen in the public arena throughout the Class Period.

37. In summary, the number of analyst reports and the substantial public dissemination of news and other information regarding FibroGen provides evidence of a robust and active market for public information about the Company and evidence that FibroGen's Common Stock traded in an efficient market during the Class Period.

#### **D. CAMMER FACTOR 3: MARKET MAKERS**

38. A market maker is a firm that is ready to buy or sell a particular stock on a regular and continuous basis.<sup>35</sup> The third *Cammer* factor states:

For over the counter markets without volume reporting, the number of market makers is probably the best single criterion. Ten market makers for a security would justify a substantial presumption that the market for the security is an efficient one; five market makers would justify a more modest presumption.<sup>36</sup>

39. The premise that the number of market makers can serve as an efficiency criterion relates to the notion that market makers are:

... [P]resumably knowledgeable about the issuing company and the stocks' supply and demand conditions (i.e., the "order flow"). Therefore, it is believed the larger the number of market makers in a given security, the

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have been removed by a proprietary function accessible in Factiva's search builder. I acknowledge that this may not reflect all news as the Factiva database is limited to certain sources and content type.

<sup>35</sup> See <http://www.sec.gov/answers/mktmaker.htm>.

<sup>36</sup> *Cammer*, 711 F. Supp. at 1293.

more information is available about it and the quicker its dissemination in the price.<sup>37</sup>

40. FibroGen Common Stock traded on a major exchange (i.e., the NASDAQ) with continuous public price and volume reporting, as opposed to an over-the-counter market without volume reporting, which is the context in which *Cammer* indicated this was a relevant criterion.<sup>38</sup> On such over-the-counter markets, there may be reason for concern regarding liquidity and information dissemination. However, these concerns are generally not applicable to stocks trading on large, modern exchanges such as the NASDAQ and NYSE, which are presumed to be efficient, report volume and trade details, and tend to have rules that virtually guarantee a liquid market.<sup>39</sup>

41. The NASDAQ and NYSE are two of the largest and most liquid security exchanges in the world with billions of shares traded each day. Unlike over-the-counter markets that rely on decentralized market makers providing liquidity for trading, the NASDAQ and NYSE rely on a computerized system to match orders and provide quotes.<sup>40</sup> The minimum requirements to be listed on the NASDAQ or NYSE and remain in good standing virtually guarantee a liquid market for that security. Therefore, the number of “market makers” itself is not a particularly relevant metric in this case.

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<sup>37</sup> Barber, B., et al., The Fraud-on-the-Market Theory and the Indicators of Common Stocks’ Efficiency, 19 J. CORP. L. 285 (1994), 291.

<sup>38</sup> See *Cammer*, 711 F. Supp. at 1292, citing Bromberg & Lowenfels: “We think that, at a minimum, there should be a presumption – probably conditional for class determination – that certain markets are developed and efficient for virtually all the securities traded there: the New York and American Stock Exchanges, the Chicago Board Options Exchange and the NASDAQ National Market System.”

<sup>39</sup> For example, there are rules for minimal market capitalization and specialists are *required* to maintain an orderly market; see *Section 102* <http://wallstreet.cch.com/LCM/Sections/>. See also, William Sharpe, Gordon J. Alexander & Jeffrey W. Bailey, *Investments*, Prentice Hall, 45-53 (5th ed. 1995); Frank J. Fabozzi, Franco Modigliani & Frank J. Jones, *Foundations of Financial Markets and Institutions*, Prentice Hall, Chapter 18 – Appendix A (4th ed. 2010).

<sup>40</sup> For NYSE, see <https://www.nyse.com/market-model>. For NASDAQ, see <https://www.nasdaqtrader.com/Trader.aspx?id=TradingUSEquities>.

42. Nevertheless, according to Bloomberg, throughout the Class Period, there were 102 market makers for FibroGen Common Stock.<sup>41</sup> Therefore, FibroGen Common Stock easily meets the letter and spirit of this factor, further supporting the efficiency of the market during the Class Period.

#### **E. CAMMER FACTOR 4: SEC FORM S-3 ELIGIBILITY**

43. The fourth *Cammer* factor is SEC Form S-3 eligibility, which states,

...[I]t would be helpful to allege the Company was entitled to file an S-3 Registration Statement in connection with public offerings or, if ineligible, such ineligibility was only because of timing factors rather than because the minimum stock requirements set forth in the instructions to Form S-3 were not met. Again, it is the number of shares traded and value of shares outstanding that involve the facts which imply efficiency.<sup>42</sup>

44. Through Form S-3, the SEC allows certain companies that have previously provided sufficiently high levels of public information to incorporate prior SEC filings by reference into current filings and not repeat the information, since it is already deemed to be widely publicly available.<sup>43</sup> In order to be eligible to issue a Form S-3, among other things, a company 1) must be subject to the Securities Exchange Act of 1934 reporting requirements for more than one year, 2) must have filed all documents in a timely manner for the past twelve months, and 3) must show that it has not failed to pay dividends or sinking funds nor defaulted on debts or material leases. Eligibility to file a Form S-3 is confirmatory evidence of efficiency, not a requirement. Interpreted in this way, the standard makes sense as an indicator of efficiency.

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<sup>41</sup> Bloomberg RANK function.

<sup>42</sup> *Cammer*, 711 F. Supp. at 1287.

<sup>43</sup> For additional information, *see* [www.sec.gov/about/forms/forms-3.pdf](http://www.sec.gov/about/forms/forms-3.pdf).

45. I have found no evidence that FibroGen was not S-3 eligible throughout the Class Period. In fact, FibroGen filed a Form S-3ASR during the Class Period on March 2, 2020.<sup>44</sup> While a Form S-3 is a registration statement for specified transactions by certain issuers, a Form S-3ASR is a type of Form S-3, but only “well-known seasoned issuers” are eligible to file S-3ASRs.<sup>45</sup> Therefore, FibroGen meets this *Cammer* efficiency factor, which supports the conclusion that FibroGen Common Stock traded in an efficient market.

#### **F. CAMMER FACTOR 5: PRICE REACTION TO NEW INFORMATION**

46. The fifth *Cammer* factor relates to how the price of a security reacts to new, company-specific information and states:

... [O]ne of the most convincing ways to demonstrate [market] efficiency would be to illustrate, over time, a cause and effect relationship between company disclosures and resulting movements in stock price.<sup>46</sup>

47. Establishing a causal connection between new company-specific information and movements in the market price is convincing, direct evidence of market efficiency. A technique often relied upon, both inside and outside of the context of litigation, to establish such a causal connection is called an “event study.” An event study is a well-accepted statistical method utilized to isolate the impact of information on market prices.<sup>47</sup> Indeed, academics used event studies as one tool for evaluating the efficient market hypothesis in the first place. Event studies have been used for over 50 years and have appeared in hundreds if not thousands of academic articles as scientific evidence in evaluating how new information affects securities prices.<sup>48</sup>

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<sup>44</sup> [https://www.sec.gov/cgi-bin/browse-edgar?action=getcompany&CIK=0000921299&type=s-3&dateb=&owner=exclude&count=40&search\\_text=](https://www.sec.gov/cgi-bin/browse-edgar?action=getcompany&CIK=0000921299&type=s-3&dateb=&owner=exclude&count=40&search_text=).

<sup>45</sup> <https://www.sec.gov/about/forms/forms-3.pdf>.

<sup>46</sup> *Cammer*, 711 F. Supp. 1291.

<sup>47</sup> A. Craig MacKinlay, *Event Studies in Economics and Finance*, 35 J. ECON. LITERATURE, 13 (1997).

<sup>48</sup> John J. Binder, *The Event Study Methodology Since 1969*, 11 REV. QUANTITATIVE FIN. & ACCT., 111 (1998).

48. An event study is a technique that can be used to measure the effect of new information on the market prices of a company's publicly traded securities. New information may include, for example, company press releases, earnings reports, SEC filings, and news reports or analyst reports. An event study is conducted by specifying a model of expected price movements conditioned on outside market factors and then testing whether the deviation from expected price movements is sufficiently large that simple random movement can be rejected as the cause.

49. To analyze cause and effect, I performed an event study to determine whether FibroGen Common Stock reacted to earnings announcements and other press releases in a manner significantly different from how the stock moved on days with no FibroGen-related news. Based on the event study I performed, which explicitly controls for market and industry factors, I find that there is a clear cause-and-effect relationship between new public information about FibroGen and the market price of FibroGen Common Stock. I now describe in further detail the event study methodology, the events I tested, and the results.

50. A well-accepted method for performing an event study is to estimate a regression model over some period of time (an "estimation window") to observe the typical relationship between the market price of the relevant security and broad market factors.<sup>49</sup> I have performed such an analysis in this matter where I evaluate the relationship between FibroGen Common Stock's daily returns (percentage change in price) controlling for the S&P 500 Total Return

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<sup>49</sup> A "regression" or "regression model" is a statistical technique for measuring the ability of one or more variables (the "independent variables") to "explain" another variable of interest (the "dependent variable"). In this case, the daily percentage change in FibroGen Common Stock (the FibroGen daily return) is the dependent variable and the contemporaneous daily returns for a market and industry index are the independent variables. For a general discussion of regression analysis, see Damodar N. Gujarati, *Basic Econometrics*, McGraw Hill, Chapters 1-3 (3rd ed. 1995).

Index (the “Market Index”) and the Nasdaq Biotechnology Total Return Index,<sup>50</sup> hereafter referred to as the “Industry Index.”<sup>51</sup>

51. For each trading day analyzed, I constructed a regression model using data from the prior 120 trading days (roughly six months).<sup>52</sup> By using a “rolling” estimation window, it allows for the relationship between FibroGen Common Stock, industry and market factors, as well as firm-specific volatility to update over time according to the data observed over the most recent 120 trading day period. Use of a rolling model to account for changing volatility and evolving relationships among market indices is accepted in peer-reviewed literature.<sup>53</sup>

52. The model indicates that there is a positive correlation between FibroGen Common Stock and the control variables. In other words, the movement of the Market Index and Industry Index helps explain the price movements of FibroGen Common Stock during the Class Period. For instance, choosing a day in the Class Period purely as an example, January 2, 2019, and looking at the regression results based on the 120 days prior to that day, the estimated coefficient for the S&P 500 is 1.31, which means that a 1% rise in the S&P 500 predicts a 1.31% increase in returns for FibroGen Common Stock. The estimated coefficient for the Industry Index is 1.82,

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<sup>50</sup> FibroGen compares its performance against the Nasdaq Biotechnology Index in its 2018 - 2021 SEC 10-K filings. Therefore, to control for industry effects, I used the Nasdaq Biotechnology Total Return Index. The Nasdaq Biotechnology Total Return Index is a modified market capitalization weighted index that tracks the performance of a set of securities listed on the Nasdaq that are classified as either biotechnology or pharmaceutical. (See, [https://indexes.nasdaqomx.com/docs/FS\\_XNBI.pdf](https://indexes.nasdaqomx.com/docs/FS_XNBI.pdf).) FibroGen has been a member of the Nasdaq Biotechnology Index from December 21, 2015 to present. As of December 31, 2018, the Industry Index had 223 constituents, including FibroGen, and FibroGen only comprised 0.49% of the Nasdaq Biotechnology Total Return Index’s total unmodified market capitalization. See SEC Form 10-K for FY 2018, *NASDAQ Biotechnology Index Methodology* at [https://indexes.nasdaqomx.com/docs/methodology\\_NBI.pdf](https://indexes.nasdaqomx.com/docs/methodology_NBI.pdf), S&P Capital IQ, Bloomberg and Thomson Reuters Eikon.

<sup>51</sup> The returns of the Industry Index are net of the S&P 500 Total Return Index.

<sup>52</sup> A. Craig MacKinlay, *Event Studies in Economics and Finance*, 35 J. ECON. LITERATURE, 15 (1997): “For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event.”

<sup>53</sup> Phillip A. Braun, *Good News, Bad News Volatility, and Betas*, 50 J. FIN. 1575, 1597 (1995).

meaning that the expected return for FibroGen Common Stock is about a 1.82% increase for every 1% increase in the Industry Index over and above the return of the S&P 500. **Exhibit 5** plots the estimated coefficients for the rolling regression models for each day during the Class Period, and it demonstrates that there is a consistently positive relationship between the Market Index, the Industry Index, and the price of FibroGen Common Stock.

53. Another important statistic from the regression is the standard deviation of the errors, which measures the degree of imprecision in the predictions from the model. Put another way, this measure provides a metric for how much unexplained price movement remains in FibroGen Common Stock after controlling for the Market Index and Industry Index. For instance, on the example date, January 2, 2019, the model predicted that absent any value relevant new firm-specific information, the price of FibroGen Common Stock would increase by 0.94% because the S&P 500 was up 0.13% and the Industry Index was up 0.45%.<sup>54</sup> Because of the inherent randomness observed in stock price returns, I do not expect the model to predict returns exactly.

54. In this example, I observe an actual return of -0.99%. Thus, the “abnormal return” for this day is -1.93% (the actual return of -0.99% minus the predicted return of 0.94%). I then rely on the standard deviation of the errors from the regression model to tell if this abnormal return of -1.93% is sufficiently large that I can reject random movement as the explanation.

55. The test for whether randomness can be rejected is done by calculating what is known as a “t-statistic,” which represents the number of standard deviations between the actual observation and the prediction. For the example date, an abnormal return of -1.93% represents -

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<sup>54</sup> The predicted return of 0.94% is found as follows:  $1.31 * 0.13\%$  (Coefficient on Market Index *times* Market Index return) +  $1.82 * 0.45\%$  (Coefficient on Industry Index Return *times* Industry Index Return) - 0.05% (constant term from regression).

0.87 standard deviations or a t-statistic of -0.87 (abnormal return of -1.93% divided by the standard deviation of the errors of 0.022).<sup>55</sup> Using the standard assumption that, in the absence of new value relevant company-specific news, abnormal returns will be normally distributed around zero, probability theory implies that based on randomness alone, using a 95% confidence level and large sample size, the abnormal return should have a t-statistic greater than 1.96 (or less than -1.96) only 5% of the time.<sup>56,57</sup> Stating this point another way, there is a 95% confidence that the actual return will fall within 1.96 standard deviations of the predicted return unless there is some non-random explanation.

56. Since our example has a t-statistic of -0.87, the abnormal return is not statistically significant at the 95% confidence level, and I cannot reject randomness as the cause of the abnormal price movement with greater than 95% confidence. By contrast, if on a particular day one observes an abnormal return that has a t-statistic of a magnitude greater than 1.96 (statistically significant at the 95% confidence level) and one observes new value relevant firm-specific information, one would reject randomness as the explanation with 95% confidence and infer that the new information is the cause of the stock price movement.

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<sup>55</sup> The standard deviation of the errors are plotted in **Exhibit 6**. The standard deviation of the error is also known as the standard error. “An estimate based on a sample is likely to be off the mark, at least by a small amount, because of random error. The standard error gives the likely magnitude of this random error, with smaller standard errors indicating better estimates.” The National Academies Press, *Reference Manual on Scientific Evidence*, Third Edition, 2011, p. 243.

<sup>56</sup> Basic statistics state that for a normally distributed variable, 5% of the observations are expected to fall outside 1.96 standard deviations from the mean. “The normal distribution has the property that the area within 1.96 standard errors of the mean is equal to 95% of the total area.” The National Academies Press, *Reference Manual on Scientific Evidence*, Third Edition, 2011, p. 342.

<sup>57</sup> The financial economics literature often identifies the 90% threshold as a relevant boundary for significance as well. David I. Tabak & Frederick C. Dunbar, “Materiality and Magnitude: Event Studies in the Courtroom,” *Litigation Services Handbook, The Role of the Financial Expert*, Ch. 19, (3rd ed. 2001).

57. **Exhibit 6** shows that the standard deviation of the errors for FibroGen Common Stock varied over the Class Period. By adopting the rolling regression model, my event study explicitly adjusts for the changing Company-specific volatility.

58. To analyze cause-and-effect, I examined the price response of FibroGen Common Stock to the 44 earnings announcement and other press releases during the Class Period.<sup>58, 59</sup> See **Exhibit 7**.<sup>60</sup>

59. There are many academic articles and financial treatises that explain theoretically and demonstrate empirically that the release of company information often (but not necessarily always) causes a significant change in investors' beliefs regarding the value of a security.<sup>61</sup> Also, newly released earnings reports and other press releases by a company are an objective set of news to identify and test. Considering the press release listed in row fifteen of **Exhibit 7** as an example, on November 8, 2019 the Company announced Phase 3 Roxadustat Safety and

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<sup>58</sup> I included all press releases except where for non-CEO personnel changes, the announcement of upcoming earnings or conferences, or other clearly immaterial news.

<sup>59</sup> For dates when FibroGen issued two press releases after-market hours on the same date, (May 9, 2019, July 24, 2019, March 1, 2021, April 6, 2021), these events have the same market date (May 10, 2019, July 25, 2019, March 2, 2021, and April 7, 2021 respectively), and are thus analyzed together. FibroGen also issued a press release after market hours on November 7, 2019, and then another press release on November 8, 2019 during market hours so these events have the same market date of November 8, 2019 and thus are analyzed together.

<sup>60</sup> Typically, to analyze cause and effect under *Cammer* factor five, I consider earnings announcements in my analysis. However, for pharmaceutical and biotechnology companies where a substantial portion of the value of the firm is based upon the future revenue of a drug that has not yet been approved, the value of the firm is highly dependent on a drug's progression through the regulatory process and the results of clinical trials. New drugs have high R&D costs and their FDA approval is uncertain. FibroGen's success relies heavily on Roxadustat and Pamrevlumab, and analysts considered this characteristic in their valuations of the company. Thus, press releases updating investors about the development stages of a drug can be highly material and value-relevant information.

<sup>61</sup> William H. Beaver, "The Information Content of Annual Earnings Announcements: New Insights from Intertemporal and Cross-Sectional Behavior," *Empirical Research in Accounting: Selected Studies, 1968*, supplement to the *Journal of Accounting Research*, Vol. 6, 67-92 (1968); Robert G. May, "The Influence of Quarterly Earnings Announcements on Investor Decisions as Reflected in Common Stock Price Changes," *Empirical Research in Accounting: Selected Studies, 1971*, supplement to the *Journal of Accounting Research*, Vol. 9, 119-163(1971); Joseph Aharony & Itzhak Swary, "Quarterly Dividend and Earnings Announcements and Stockholders' Returns: An Empirical Analysis," *The Journal of Finance*, Vol. 35, No. 1, 1-12 (1980).

Efficacy Results.<sup>62, 63</sup> In response, the market price of FibroGen Common Stock increased by 9.61%, compared to the predicted return of 2.64%. Thus, the abnormal return on November 8, 2019, was 6.97%. With a t-statistic of 4.01, this abnormal price movement is statistically significant at the 99% level, and I therefore have scientific evidence that FibroGen Common Stock reacted rapidly to this new information.

60. Similar to this example, I analyzed the market reaction to FibroGen's other earnings announcements and press releases I identified above. In total, of the 44 press releases FibroGen issued during the Class Period, 13 resulted in statistically significant price movements above the 95% confidence level.<sup>64, 65</sup>

61. **Exhibit 7** presents a summary of the earnings announcement and other press releases during the Class Period.

62. I then compared these results against the 217 days during the Class Period where I identified no FibroGen-related news from the Factiva database and when there were no analyst reports or SEC filings issued.<sup>66</sup> Of these 217 days, there were only eight days with a statistically significant price movement. Thus, during the Class Period there was a statistically significant

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<sup>62</sup> See, "FibroGen Announces Positive Phase 3 Pooled Roxadustat Safety and Efficacy Results for Treatment of Anemia in Chronic Kidney Disease," *GlobeNewswire*, November 8, 2019; "FibroGen Presents Phase 3 Efficacy and Safety Results for Roxadustat Versus Epoetin Alfa as Treatment of Anemia in Incident Dialysis Patients with Chronic Kidney Disease," *GlobeNewswire*, November 7, 2019 (4:39 PM).

<sup>63</sup> See, for example, "We believe the data are positive and supports our view that Roxa is highly efficacious and non-inferior on cardiovascular safety." ("Front Row ASN - Data Supports Clean Safety, Our Discussions w/ The Lead Doc," *Jefferies*, November 8, 2019).

<sup>64</sup> It is not unusual to observe many earnings announcements or other press releases that are not statistically significant. This happens, for instance, in quarters where there is insufficient surprise and/or the firm roughly met expectations, if the firm offered little change in guidance, and/or if there was a mix of both positive and negative information.

<sup>65</sup> Of the 13 press releases statistically significant at the 95% confidence level, 10 of these are also statistically significant at the 99% level.

<sup>66</sup> If on a date, with otherwise no FibroGen related news, an analyst report is issued about FibroGen's roxadustat development partners, AstraZeneca and/or Astellas, and mentions roxadustat, I no longer consider that date a "no news" date.

price reaction at the 95% confidence level or greater on 29.55% of the earnings announcements and other press release dates, but when compared to days with no FibroGen-related news, I observed only 3.69% statistically significant reactions.<sup>67,68</sup> This is powerful scientific evidence of a cause-and-effect relationship between new publicly released information concerning the Company and changes in the price of FibroGen Common Stock.

63. Furthermore, on the 217 days with no news, the average change in price of FibroGen Common Stock was 1.53%, after controlling for market and industry factors, while the average change in FibroGen Common Stock on earnings announcement and other press release dates after controlling for market and industry factors was 4.55%. In other words, the average magnitude of stock price movement on earnings announcement and other press release days was about 3 times higher than on days with no news.<sup>69</sup> Again, this demonstrates that on days when important company-specific information is released to the market, FibroGen's stock price moves much more than on days where there is no company-specific news. This provides further evidence of a cause-and-effect relationship between company-specific news and changes in the price of FibroGen Common Stock, and thus an efficient market.

64. The bar charts below summarize this analysis while **Exhibit 8** gives more detail.

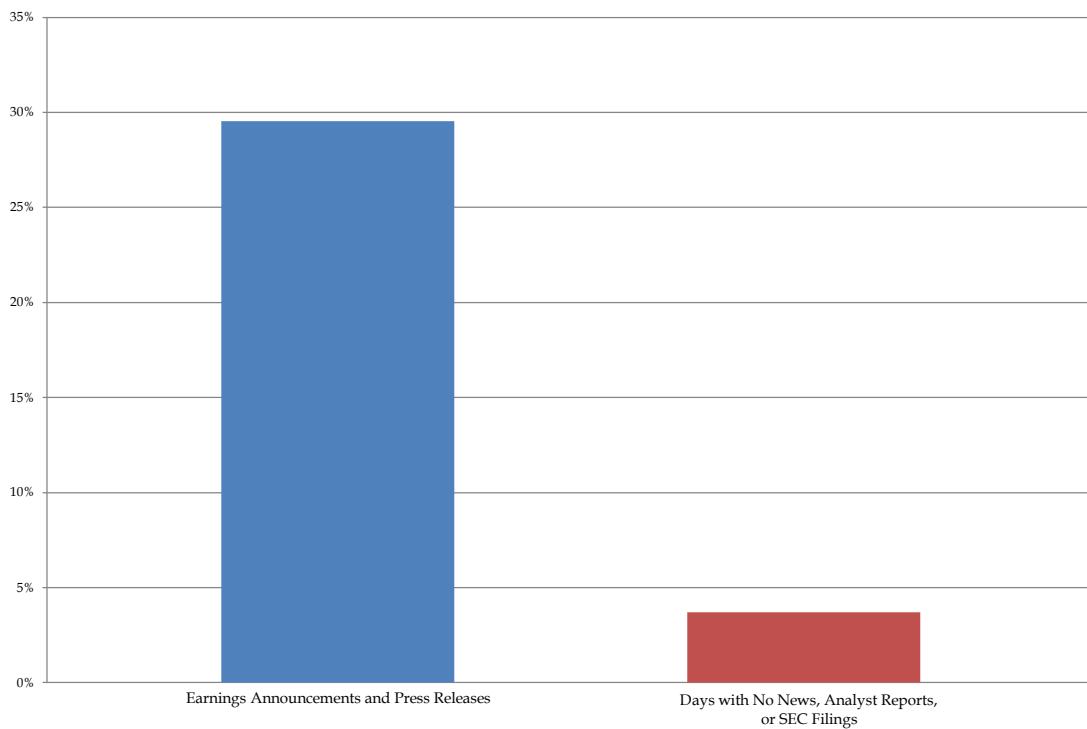
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<sup>67</sup> This difference between 29.55% and 3.69% is itself statistically significant at the 99% confidence level.

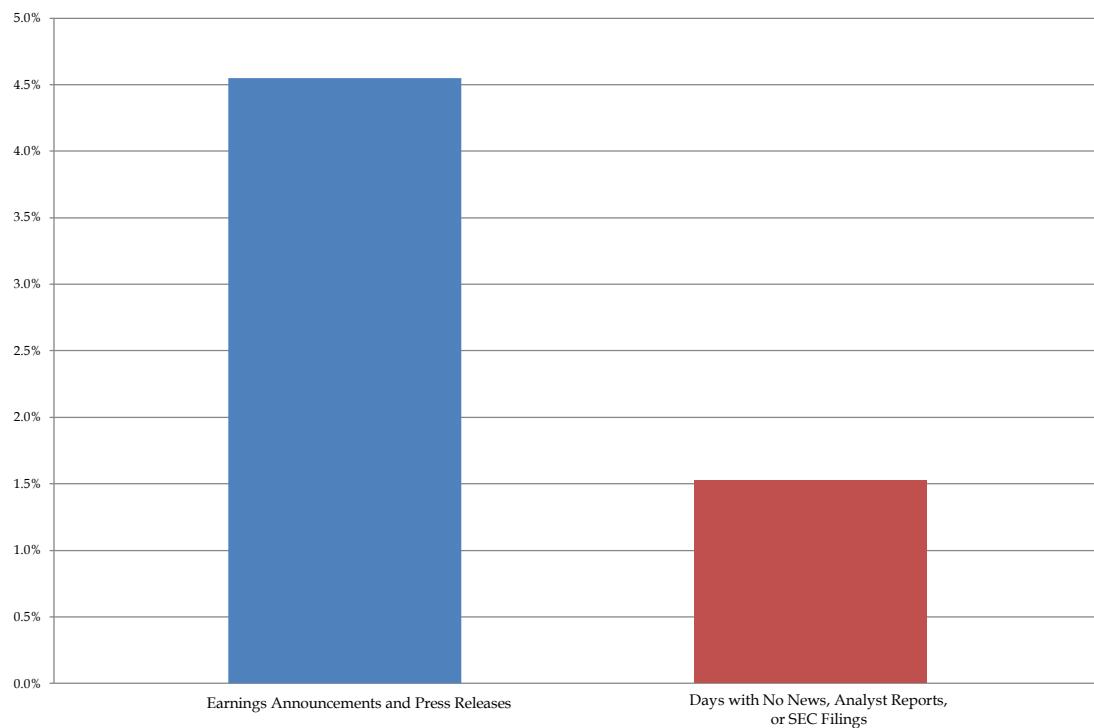
<sup>68</sup> Based on randomness alone, one would expect 5% of the no news days to be statistically significant. The observed rate of 3.69% is not statistically significantly different than 5%.

<sup>69</sup> This difference between 4.55% and 1.53% is itself statistically significant at the 99% confidence level.

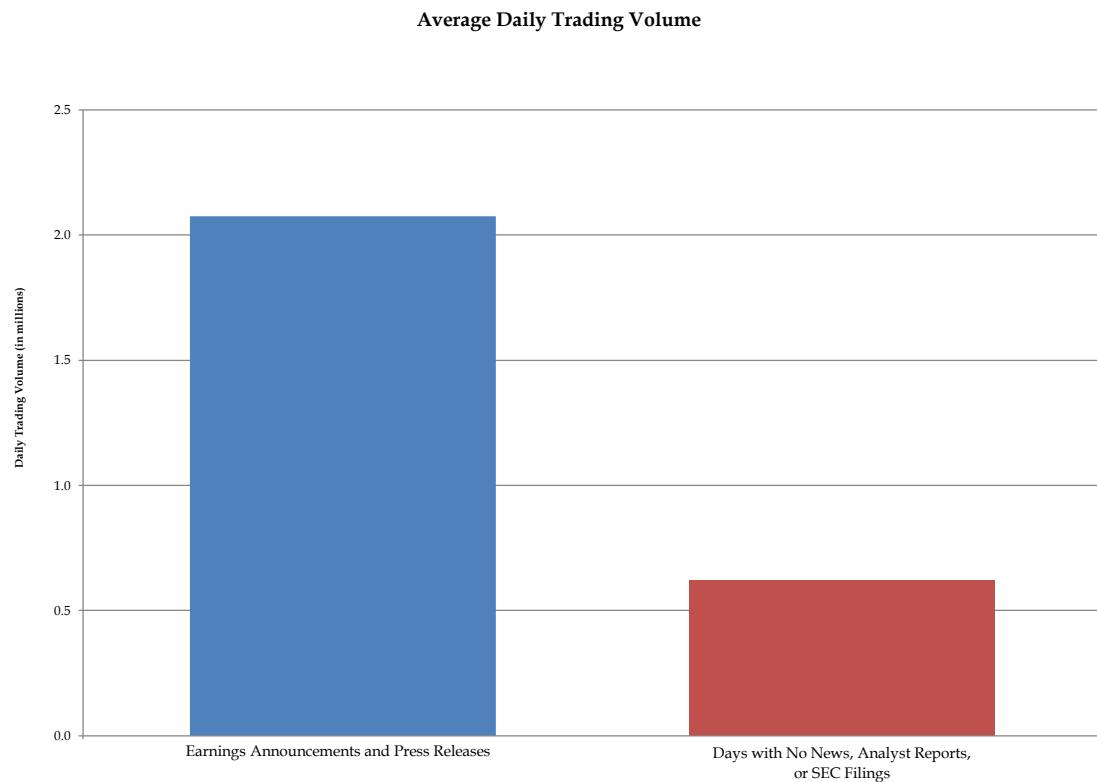
Percentage of Days Significant at the 95% Confidence Level



Average Absolute Abnormal Return



65. Finally, when important Company-specific news is released to the market (e.g. earnings announcements and other press releases), the daily trading volume of FibroGen Common Stock also tends to be much higher<sup>70</sup> than on days where there is no news. For instance, the average daily trading volume of the 44 days with earnings announcements and other press releases was 2.1 million. Compare this to the average daily trading volume of 0.6 million for days where there is no FibroGen news in the Class Period.<sup>71</sup> The bar chart below summarizes this analysis.



66. The bar charts above establish a strong cause-and-effect relationship between new, Company-specific news and rapid changes in the price of FibroGen Common Stock. The

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<sup>70</sup> William H. Beaver, "The Information Content of Annual Earnings Announcements," *Empirical Research in Accounting: Selected Studies, 1968*, supplement to the *Journal of Accounting Research*, Vol. 6, 69, 84 (1968).

<sup>71</sup> This difference between 2.1 million and 0.6 million is itself statistically significant at the 99% confidence level.

earnings announcement and other press release days have a much greater percentage of significant price movements, higher daily trading volume on average, and statistically significantly larger price changes than those found on days with no news.

67. In conclusion, the event study analysis presented in this section demonstrates a clear cause-and-effect relationship between new material news and changes in the market price of FibroGen Common Stock during the Class Period.

#### **G. KROGMAN FACTOR 1: MARKET CAPITALIZATION**

68. In *Krogman v. Sterritt*, discussed above, the court noted that economic theory includes other possible relevant factors for determining whether a stock trades in an efficient market, in addition to the *Cammer* factors.<sup>72</sup> The *Krogman* court held, “[m]arket capitalization, calculated as the number of shares multiplied by the prevailing share price, may be an indicator of market efficiency because there is a greater incentive for stock purchasers to invest in more highly capitalized corporations.”<sup>73</sup> Furthermore, Thomas and Cotter find that firms with a larger market capitalization tend to have “larger institutional ownership and tend to be listed on the New York Stock Exchange with a greater analyst following.”<sup>74</sup> Therefore, market capitalization is another quantifiable measure that is likely correlated with efficiency.

69. FibroGen Common Stock had a higher market capitalization than the majority of NASDAQ and NYSE stocks during the Class Period, thus suggesting this factor is supportive of efficiency. There were between approximately 85 million and 92 million shares of FibroGen

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<sup>72</sup> *Krogman v. Sterritt*, 202 F.R.D. 467 (N.D. Tex. 2001) (“*Krogman*”). The factors identified by the *Krogman* Court are 1) market capitalization, 2) size of float of common stock, and 3) bid-ask spread.

<sup>73</sup> *Krogman*, 202 F.R.D. at 478.

<sup>74</sup> Randall S. Thomas & James F. Cotter, *Measuring Securities Market Efficiency in the Regulatory Setting*. 63 LAW & CONTEMP. PROBS. 117 (2000).

Common Stock outstanding throughout the Class Period.<sup>75</sup> Based on the market price, the market capitalization for FibroGen Common Stock averaged \$3.61 billion during the Class Period.

**Exhibit 9** shows FibroGen's market capitalization over the Class Period. **Exhibit 10** shows that during the Class Period, FibroGen's market capitalization ranged from the 67<sup>th</sup> to 80<sup>th</sup> percentile of the combined NASDAQ and NYSE markets for the applicable quarters during the Class Period.<sup>76</sup> In other words, over the Class Period, FibroGen Common Stock had a higher market capitalization than at least 67% of the firms on the combined NASDAQ and NYSE exchanges.

70. Given that the market capitalization for FibroGen Common Stock was consistently large relative to other publicly traded companies, this factor is supportive of market efficiency for FibroGen Common Stock.

#### **H. KROGMAN FACTOR 2: THE BID-ASK SPREAD**

71. The *Krogman* court's second additional efficiency factor considered the bid-ask spread for a security, explaining "[a] large bid-ask spread is indicative of an inefficient market, because it suggests that the stock is too expensive to trade."<sup>77</sup> The bid-ask spread is an important indicator of the degree to which a market is developed. The bid-ask spread represents a measure of the cost to transact in a market. Narrow bid-ask spreads indicate less uncertainty regarding valuation and that reasonably sized trades will not substantially impact the market price. Wider bid-ask spreads indicate greater liquidity costs and less ability to trade without moving the market price. In addition, the wider the bid-ask spread, the more costly it is to arbitrage away small inefficiencies because the cost of the trade could be greater than the perceived inefficiency.

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<sup>75</sup> FibroGen SEC filings. See **Exhibit 12**.

<sup>76</sup> Bloomberg EQS Function.

<sup>77</sup> *Krogman*, 202 F.R.D. at 478.

Thus, a narrow bid-ask spread supports the presence of an efficient market where the prices reflect publicly available information.

72. I analyzed bid-ask spreads for FibroGen Common Stock during the Class Period. **Exhibit 11** shows that during this period, the time-weighted average percentage bid-ask spread for FibroGen Common Stock in each month was between 0.034% and 0.133%.<sup>78</sup> This is well below the average and median bid-ask spread of a random sample of 100 other common stocks trading on the NASDAQ and NYSE in April 2020 (the full month of the Class Period during which FibroGen had the largest percentage bid-ask spread).<sup>79,80</sup> **Exhibit 11** demonstrates that FibroGen Common Stock had a monthly average bid-ask spread of 0.133% in April 2020, while a randomly selected group of 100 other common stocks on the NASDAQ and NYSE had an average bid-ask spread of 1.00%. Accordingly, FibroGen Common Stock's bid-ask spread was low during the Class Period, and this factor further supports market efficiency for FibroGen Common Stock.

### I. KROGMAN FACTOR 3: PUBLIC FLOAT

73. The final factor that the *Krogman* court identified as being indicative of market efficiency is the public float (i.e., the amount of shares not held by insiders). As shown in

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<sup>78</sup> The time-weighted average bid-ask spread was calculated by taking the average of the spread during trading hours on the primary exchange of each security, weighted by the amount of time each quote prevails in the market. That is, I take the weighted average quote, with the weight being the number of seconds between that quote and the next quote that occurs. Spread is calculated as the difference between the bid price and ask price divided by the midpoint of the bid-ask spread. I calculated the National Best Bid and Offer using the data filtering procedures described in Roger D. Huang & Hans R. Stoll, *Dealer versus auction markets: A paired comparison of execution costs on NASDAQ and the NYSE*, 41 J. FIN. ECON. 313 (1996).

<sup>79</sup> Quote data for FibroGen and other publicly traded stocks were obtained from the TICK database. See <https://tickapi.tickdata.com/>.

<sup>80</sup> I constructed a random sample because I am not aware of any exchange-wide reporting of average or median bid-ask spreads. Determining the average bid-ask spread for the entire market would be a very costly and data intensive process, therefore I adopted a random sampling methodology. I determined the constituents of the NYSE and NASDAQ for April 2020 and then randomly generated a list of 100 common stock securities. I then calculated the time-weighted average monthly bid-ask spread for April 2020.

**Exhibit 12**, during the Class Period, insiders held, on average, 8.26% of all outstanding shares of FibroGen Common Stock. This means that 91.74% of FibroGen's shares during the Class Period were held by non-insiders. This large percentage of shares held by non-insiders supports market efficiency.

#### **J. ADDITIONAL FACTOR: INSTITUTIONAL OWNERSHIP**

74. Institutional investors are considered to be sophisticated and well-informed, with access to most publicly available information for the stocks that they own. These investors include mutual funds, pension funds, investment banks, and other types of large financial institutions that have substantial resources to analyze the securities they purchase for their portfolios. As **Exhibit 12** shows, 472 separate institutions owned FibroGen Common Stock during the Class Period, holding on average 74.74% of public float. This substantial level of institutional ownership of FibroGen Common Stock during the Class Period coupled with the high trading volume further supports a conclusion of market efficiency.

#### **K. ADDITIONAL FACTOR: AUTOCORRELATION**

75. If previous price movements of a security have the ability to predict future price movements, then it is said to be "autocorrelated." Autocorrelation is relevant to efficiency because if the autocorrelation is persistent and sufficiently large that a trader could profit from taking advantage of the autocorrelation, it means that past price movements are not fully reflected in the current price, which would suggest market inefficiency.

76. Autocorrelation may occur from time to time for random reasons or due to the pattern of firm-specific news. Efficiency would only be violated, however, if the autocorrelation

were large enough and persistent enough that a trader could consistently earn riskless profits over time.<sup>81</sup>

77. A well-accepted methodology to test for the existence of autocorrelation is to run a regression analysis that tests whether, on average, the abnormal return from the previous day has a statistically significant effect on the abnormal return today.<sup>82</sup> If the previous day's abnormal return has no statistically significant predictive power, then there is no evidence of autocorrelation.

78. **Exhibit 13** displays the autocorrelation coefficient for FibroGen Common Stock using the abnormal returns from the event study model described above. The coefficient for the Class Period is not statistically different than zero, meaning there is no evidence of statistically significant autocorrelation in the trading of FibroGen stock during the Class Period. These results are consistent with the notion that an investor could not consistently predict abnormal movements and earn arbitrage profits. Therefore, this factor also supports the conclusion that FibroGen Common Stock traded in an efficient market throughout the Class Period.

## L. ADDITIONAL FACTOR: OPTIONS

79. In addition to the factors analyzed above, there was also considerable option trading in FibroGen Common Stock during the Class Period.<sup>83</sup> Academic articles have demonstrated that options written on existing assets can improve efficiency by permitting an expansion of the contingencies that are covered by the market.<sup>84</sup> Empirical analysis has shown that option listings

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<sup>81</sup> Doron Avramov, Tarun Chordia & Amit Goyal, *Liquidity and Autocorrelations in Individual Stock Returns*, 61 J. FIN. 2365, 2367-68 (2006); Michael C. Jensen, *Some Anomalous Evidence Regarding Market Efficiency*, 6 J. FIN. ECON. 95-101 (1978).

<sup>82</sup> William H. Greene, *Econometric Analysis*, Prentice Hall, Sixth Edition, 2008, Chapter 19, p. 644.

<sup>83</sup> For instance, according to iVolatility, there were 316,541 FibroGen Common Stock put contracts and 416,070 FibroGen Common Stock call contracts that traded during the Class Period.

<sup>84</sup> Stephen A. Ross, *Options and Efficiency*, 90 Q. J. ECON. 75 (1976).

are associated with a decrease in bid-ask spread and increase in quoted depth, trading volume, trading frequency, and transaction size – an overall improvement of the market quality of the underlying stocks.<sup>85</sup> Thus, this factor also supports that FibroGen Common Stock traded in an efficient market throughout the Class Period.

### **VIII. EFFICIENCY FOR CALL AND PUT OPTIONS ON FIBROGEN COMMON STOCK**

80. Options are derivative securities, a type of security whose value is dependent on the market price of an underlying security or asset. In this case, during the Class Period, the pricing for the FibroGen Options at issue was dependent on the market price of FibroGen Common Stock.

81. There are two basic types of options: call options and put options. A call option gives the holder of the option the right to buy an asset (in this case, FibroGen Common Stock) by a certain date, called the expiration date, and at a certain price, called the strike price or exercise price. A put option gives the holder the right to sell an asset (in this case, FibroGen Common Stock) by an expiration date at the strike price. Options can be either American or European, with the distinction being that American options can be exercised at any time up until the expiration date, whereas European options can be exercised only on the expiration date itself.<sup>86</sup> The price of an option, also referred to as the “premium,” depends on a number of factors, including how the current stock price compares to the exercise price, the amount of time to

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<sup>85</sup> Raman Kumar, Atulya Sarin & Kuldeep Shastri, The Impact of Options Trading on the Market Quality of the Underlying Security: An Empirical Analysis, 53 J. FIN. 717 (1998).

<sup>86</sup> John Hull, *Options, Futures and Other Derivatives*, 7<sup>th</sup> Edition, Prentice Hall, 2009, p. 6.

expiration, anticipated dividends,<sup>87</sup> expected volatility of the underlying stock, and interest rates.<sup>88</sup>

82. All of the FibroGen Options traded during the Class Period were American options and were listed on multiple major options exchanges including the NASDAQ Options Exchange<sup>89</sup> and the Chicago Board Options Exchange (“CBOE”).<sup>90</sup> During the Class Period, a total of 592 call option series and 592 put option series were listed; 421 call option series and 386 put option series had non-zero trading volumes during this period. The expiration dates for these options ranged from December 21, 2018 to December 17, 2021, and the strike prices ranged from \$7.50 to \$95.00.<sup>91</sup> For example, one call option series had an expiration date of November 20, 2020, and an exercise price of \$42.50 per share. This call option gave the holder the right to buy FibroGen Common Stock at \$42.50 per share any time prior to November 20, 2020.

83. As I demonstrated in **Section VII**, FibroGen Common Stock satisfied each of the efficiency factors. If one concludes that FibroGen Common Stock was priced efficiently and therefore reflected the value of the alleged misstatements and omissions, it is then logical and natural to conclude that because option pricing is dependent on the stock price, the inflation caused by the misrepresentations and omissions affecting the stock price would translate into the

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<sup>87</sup> NASDAQ notes that FibroGen did not pay dividends to investors during the Class Period (<https://www.nasdaq.com/market-activity/stocks/fgen/dividend-history>).

<sup>88</sup> John Hull, “Chapter 9: Properties of Stock Options” in *Options, Futures and Other Derivatives*, 7<sup>th</sup> Edition, Prentice Hall, 2009, pp. 201-204.

<sup>89</sup> <http://www.nasdaq.com/options/>.

<sup>90</sup> [https://www.cboe.com/us/options/symboldir/equity\\_index\\_options/?sid=F](https://www.cboe.com/us/options/symboldir/equity_index_options/?sid=F)

<sup>91</sup> Data on options for FibroGen Common Stock were provided by iVolatility. See [www.ivolatility.com](http://www.ivolatility.com). For each option series, the iVolatility data contains on a daily basis, the following: bid price, ask price, mean transaction price, volume, open interest, implied volatility, and standard option sensitivities (known as delta, gamma, vega/kappa, theta, and rho).

value of derivative instruments such as call and put options by definition (so long as the options traded efficiently).<sup>92</sup>

84. Notwithstanding, there are certain reliable methods for evaluating whether the options themselves traded efficiently. A standard and well-accepted method for evaluating efficient trading in options markets is to test what is known as “put-call parity.”<sup>93</sup> Put-call parity refers to a specific relationship that must exist between the price of the underlying security and prices of put and call options with the same expiration date and strike price. If the prices of a put-call pair are not consistent with each other and the underlying security, there would be a violation of put-call parity and a potential arbitrage opportunity. An arbitrage opportunity exists when a trader has the ability to earn a risk-free profit based on inconsistent pricing of securities. Prices that exhibit a consistent pattern of arbitrage opportunities would be inconsistent with market efficiency.

85. For American options on dividend paying stocks, the put-call parity relation implies an upper and lower bound on the value of the put and call option prices such that:

$$S_0 - D - K \leq C - P \leq S_0 - Ke^{-rT}$$

where  $S_0$  denotes the current price of the underlying common stock,  $D$  denotes the present value of future dividends that will occur prior to expiration of the option,<sup>94</sup>  $K$  denotes the exercise price

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<sup>92</sup> This point is clear from the fact that option valuation models, such as the Black-Scholes model, depend directly on the current underlying stock price, *see* John Hull, “Chapter 12: The Black-Scholes Model” in *Options, Futures and Other Derivatives*, 5th Edition, Prentice Hall, 2003.

<sup>93</sup> Robert C. Klemkosky and Bruce G. Resnick, “Put-Call Parity and Market Efficiency,” *The Journal of Finance*, Vol. 34, No. 5, December 1979, pp. 1141-1155; Avraham Kamara and Thomas W. Miller, Jr., “Daily and Intradaily Tests of European Put-Call Parity,” *The Journal of Financial and Quantitative Analysis*, Vol. 30, No. 4, December 1995, pp. 519-539; Leng Y. Goh and David Allen, “A Note on Put-call Parity and the Market Efficiency of the London Traded Options Market,” *Managerial and Decision Economics*, Vol. 5, No. 2, June 1984, pp. 85-90.

<sup>94</sup> As noted earlier, FibroGen did not pay dividends to investors during the Class Period so the dividend portion is assumed to be zero.

of the options,  $C$  is the call option price,  $P$  is the put option price,  $r$  is the risk-free interest rate and  $T$  is the time to expiration of the options.<sup>95</sup>

86. I tested both the upper and lower bounds over the pairs of FibroGen Options with valid bid and ask prices.<sup>96</sup> Of the 50,502 tests of put-call parity over the option series and the 645 option trading days during the Class Period, put-call parity held for 50,492 of the tests, or 99.98% of the time. In fact, there were only 10 violations to put call parity that occurred, which represents 0.02% of all tests (see **Exhibit 14**). This provides evidence that the market prices of FibroGen Options consistently reacted contemporaneously with changes in the market price of FibroGen Common Stock so as to prevent arbitrage opportunities. This is strong evidence that FibroGen Options traded efficiently and that any mispricing due to the alleged misstatements and omissions would translate into the prices of FibroGen Options.

87. Because the put-call parity relationship incorporates the price of FibroGen Common Stock, the evidence of efficiency for FibroGen Options also bolsters the evidence that FibroGen Common Stock traded in an efficient market during the Class Period. The put-call parity analysis indicates that there was no evidence of consistent arbitrage opportunities between FibroGen Options and FibroGen Common Stock.

88. Similar to how I test for a cause-and-effect relationship between new news and changes in FibroGen Common Stock prices (*i.e. Cammer factor five*),<sup>97</sup> I also perform such a test

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<sup>95</sup> For details, see John Hull, *Options, Futures and Other Derivatives*, 7<sup>th</sup> Edition, Prentice Hall, 2009, pp. 214-215.

<sup>96</sup> To summarize, I tested put-call parity for FibroGen Call and FibroGen Options on a daily basis using the closing stock price and the last bid and ask prices for each option series. All inputs necessary to test put-call parity were obtained from iVolatility except for the risk-free interest rate, which was obtained from FRED. The ask price for the Call Option and the bid price for the Put Option were used for the lower bound; and the bid price for the Call Option and the ask price for the Put Option were used for the upper bound in the put-call parity inequality. According to NASDAQ, FibroGen did not provide dividends to investors during the Class Period (<https://www.nasdaq.com/market-activity/stocks/fgen/dividend-history>). Put-call parity tests were performed for all available FibroGen option series pairs during the Class Period.

<sup>97</sup> See, Section VII.F.

for FibroGen Options and find that there is strong statistical evidence that FibroGen Option Prices react to new news. The price of an option can change based on a number of factors even if the price of the underlying stock is constant. These factors include, but are not limited to, the level of the stock price in relation to the strike price, time to maturity, and volatility. Therefore, I utilize the well-known and standard Black-Scholes pricing model, along with the expected changes in FibroGen stock price based upon the regression analysis described in **Section VI** to quantify the expected price movement for an individual option series on each relevant date.<sup>98</sup> In other words, by using the FibroGen Common Stock expected return and the Black Scholes formula, I control for option price movements expected based upon changes in the Market Index, Industry Index, and the value of other factors in the Black Scholes Model including the strike price, time to maturity, risk free rate of interest, and volatility of FibroGen Common Stock.<sup>99</sup>

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<sup>98</sup> The Black-Scholes model was developed by Fischer Black and Myron Scholes in the 1970s, for which Myron Scholes received the Nobel Prize. The Black-Scholes formula holds that an option price is a function of the time to expiration, the underlying stock price, the strike price, the risk-free interest rate, and the volatility of the underlying security.

<sup>99</sup> More specifically, to obtain the predicted return for each option series on day  $t$ , I determine how much of a price change is expected by using the Black-Scholes Formula on both day  $t-1$  and day  $t$ . On day  $t-1$ , I compute a theoretical price ( $P_{t-1}$ ) using the observed underlying stock price on day  $t-1$ , the strike price, the time to maturity as of  $t-1$ , the risk-free rate of interest on day  $t-1$ , and the implied volatility on day  $t-1$ . I then calculate a theoretical price for day  $t$  ( $P_t$ ) where the underlying stock price is equal to the stock price on day  $t$  multiplied by  $(1+r_{\text{expected}})$  where  $r_{\text{expected}}$  is the expected return from my market model regression for FibroGen Stock described above, the time to maturity as of day  $t$ , the risk-free rate of interest on day  $t$ , the strike price (which did not change) and the implied volatility from day  $t-1$ . I use the implied volatility from day  $t-1$  instead of day  $t$  because the news itself may be a contributor to changes in implied volatility of the underlying security. Then I calculate an expected return for the option series as  $(P_t/P_{t-1}) - 1$ .

89. I am able to quantify the abnormal price return for each option by subtracting the expected return from the actual observed return. Once I have the abnormal return, I can then test whether the abnormal return is statistically significant.<sup>100</sup> <sup>101</sup>

90. **Exhibit 15** summarizes the results for earnings announcements and company press releases. As one would expect in an efficient market, there are a substantial number of option series that have statistically significant returns on earnings announcements and company press releases when there is a significant change in the underlying common stock and far less when there is no significant change in the underlying stock price.

91. To further test cause and effect, I undertake the same methodology I applied to FibroGen Common Stock. In other words, I analyze whether there is statistical evidence showing that there is a greater prevalence of statistically significant price movements, magnitude of price movements, and trading volume on earnings events and other press releases compared to “no news” days.<sup>102</sup> These results are shown on **Exhibit 16** for FibroGen Call Options and **Exhibit 17** for FibroGen Put Options.

92. **Exhibit 16** shows that I observe statistically significant price changes on FibroGen Call Option series at the 99% significance level on 499 of 2,351 of the observable returns on

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<sup>100</sup> To test for statistical significance, I compute a t-statistic by dividing the abnormal return by the standard deviation of abnormal returns for that particular series over the prior 20 trading days (or for the first 20 days for an option series issued during the Class Period: the standard deviation of abnormal returns for the first 20 days). Abnormal returns for days that are excluded from the common stock market model regression are also excluded from the calculation of the standard deviation for each option series.

<sup>101</sup> I have excluded observations in the option pricing data where the bid price was listed as \$0 as they do not reflect the presence of an actionable bid price. Exclusion of such observations is also consistent with how the Chicago Board Options Exchange treats options pricing data when computing its VIX index product and with other literature that utilizes the same iVolatility data. *See*, “Cboe VIX White Paper: Cboe Volatility Index,” *Cboe Exchange, Inc.*, 2021. *See also*, “Addendum to Cboe VIX White Paper / Cboe Volatility Index,” *Cboe Exchange, Inc.*, August 2, 2021. Chang, Bo Young and Greg Orosi, “A Simple Method for Extracting the Probability of Default from American Put Option Prices,” Staff Working Paper, Funds Management and Banking Department, *Bank of Canada*, April 20, 2020. Gudmundsson, Hilmar and David Vyncke, “A Generalized Weighted Monte Carlo Calibration Method for Derivative Pricing,” *Mathematics* 2021, 9, 739.

<sup>102</sup> *See* ¶ 62 above for a description of how “no news” days were identified.

earnings announcement and press release days (or 21.23%), while on “no news” days, the rate of statistical significance is only 7.12%. This difference is statistically significant. Likewise, the average abnormal price movement on earnings announcement and press release days is statistically significantly higher than the same figure for “no news” days. As further evidence, when compared to “no news” days, there was a statistically significant increase in trading volume on earnings announcement and/or press release days. Finally, **Exhibit 16** shows that when a subset of only earnings and press release days that are statistically significant for the common stock are examined in relation to “no news” days, the statistically significant differences between “news” and “no news” days becomes even more pronounced. **Exhibit 17** shows qualitatively similar results for FibroGen put Options. As I found for FibroGen Common Stock, these comparisons indicate that on days when important company-specific information was released to the market (earnings announcements and company press releases), FibroGen Option prices move much more than on days where there was no news. Together, this provides further evidence of a cause-and-effect relationship between company-specific news and changes in FibroGen Option prices, and thus that FibroGen Options traded efficiently.

## IX. DAMAGES

93. Counsel for Lead Plaintiffs also asked me to opine on whether per share damages could be measured for all Class members under Section 10(b) of the Exchange Act using a common methodology that is consistent with the Lead Plaintiffs’ theory of liability. There is a standard and well-accepted method for calculating class wide damages in cases under Section 10(b) of the Exchange Act. This method, typically referred to as the “out-of-pocket” method, states that damages are equal to the artificial inflation in the share price at the time of purchase minus the artificial inflation per share at the time of sale (or, if the share is not sold before full

revelation of the fraud, the artificial inflation at the time of purchase, subject to the Private Securities Litigation Reform Act of 1995’s (“PSLRA”) “90-day lookback” provision,<sup>103</sup> a formulaic limit on damages that also can be applied class-wide).<sup>104</sup> The out-of-pocket method has been applied in virtually every matter in which I have observed or participated in as a consulting, testifying, or neutral expert.

94. Once the inflation per share has been quantified on each day during the class period, the computation of damages for each class member is formulaic based upon information collected in the claims process (*i.e.*, the investor’s purchase and sale history for the security, which is routinely available from brokerage statements and/or other documents that provide evidence of securities transactions). Therefore, there is a well-accepted method to compute damages in Section 10(b) matters such as this.

95. Separate and apart from whether there is a common method for computing damages is the question of how to quantify the artificial inflation per share that is an input to the damages methodology. The quantification of the artificial inflation per share requires a detailed loss causation analysis.<sup>105</sup> Nevertheless, whatever the method for determining the artificial inflation per share, it would be common to all class members.

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<sup>103</sup> Specifically, the PSLRA states: “...in any private action arising under this title in which the plaintiff seeks to establish damages by reference to the market price of a security, the award of damages to the plaintiff shall not exceed the difference between the purchase or sale price paid or received, as appropriate, by the plaintiff for the subject security and the mean trading price of that security during the 90-day period beginning on the date on which the information correcting the misstatement or omission that is the basis for the action is disseminated to the market.” See, Private Securities Litigation Reform Act of 1995, dated December 22, 1995, 737, 748-49.

<sup>104</sup> For sellers of put options, the formula should focus on the change in artificial “deflation” rather than “inflation,” but the economic concept that the damages are based on the change in the distortion of the price caused by the misrepresentations or omissions is precisely the same.

<sup>105</sup> I have not been asked to conduct a loss causation analysis at this time. In my experience, loss causation analyses are often informed by information learned in discovery.

96. For example, the most widely-used technique to quantify artificial inflation starts from an event study that measures price reactions to disclosures that revealed the relevant truth concealed by the alleged material omissions and/or misrepresentations (i.e. a “corrective disclosure”).<sup>106</sup> Such an event study would also need to consider whether and to what extent any non-fraud related information (i.e. “confounding information”) contributed to the observed price movement. If there is such confounding information, disaggregating the price impact of corrective disclosures from confounding information may utilize valuation techniques and may depend on information learned through discovery. Determining the specific valuation approach necessary to perform a loss causation analysis that reasonably disaggregates corrective and confounding information is an inherently case-specific question that depends on specific facts and circumstances. Examples of such techniques include, but are not limited to, fundamental valuation analysis such as discounted cash flow methods, valuation multiple methods (i.e. price to earnings multiples, price to EBITDA multiples, price to revenue multiples, etc.), use of academic studies regarding the value of certain types of information, and other available valuations whether from securities analysts or made available through discovery. Regardless of the technique used, it is performed on a class-wide basis – in other words, the specific methodology applies regardless of the identity or circumstances of any individual class member.

97. The loss causation analysis would also require an analysis of how inflation per share may have evolved over the class period. Again, the nature of this analysis is intensely factual, case-specific, and may depend on information learned through discovery. For example, an often-used method is to assume “constant dollar inflation,” which implies that the artificial

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<sup>106</sup> The event study I have performed for this report is for Market Efficiency purposes and is not an attempt at valuing artificial inflation.

inflation was the same dollar amount during the class period. In certain circumstances, it may be more reasonable to apply “constant percentage inflation,” which implies the price was inflated by a consistent percentage in the absence of additional disclosures. In other circumstances, the artificial inflation has evolved based upon the nature and timing of specific misstatements or the inflation varied on a daily basis as a result of information contained in internal documents obtained in discovery. To summarize, the determination of how artificial inflation evolved over the class period is also a case-specific, fact-specific loss causation exercise that can rely on valuation techniques including, but not limited to, event studies, fundamental valuation, contemporaneous valuations or documents, or some combination of the above. Once again, however, all of these loss causation methodologies are class-wide in nature and do not depend on the identity or circumstance of any specific investor.

98. Accordingly, although I have not been asked to calculate class-wide damages in this report, and such calculations would likely depend, in part, on the completion of discovery, and full development of the case record, based on my expertise and experience in dozens of similar matters and understanding the nature of the claims in this case, I conclude that damages in this action are subject to a well-settled, common methodology that can be applied to the Class as a whole.

## **X. CONCLUSION**

99. In sum, every factor analyzed supports my opinion that FibroGen Common Stock and FibroGen Options traded in efficient markets during the Class Period. Furthermore, class-wide damages in this matter can be calculated on a class-wide basis using a common methodology for the eligible FibroGen Securities.

100. I declare under penalty of perjury under the laws of the United States of America  
that the foregoing is true and correct.

Executed on January 27, 2023.



Chad Coffman

## Exhibit 1

### Summary of Efficiency Factors for FibroGen Inc.

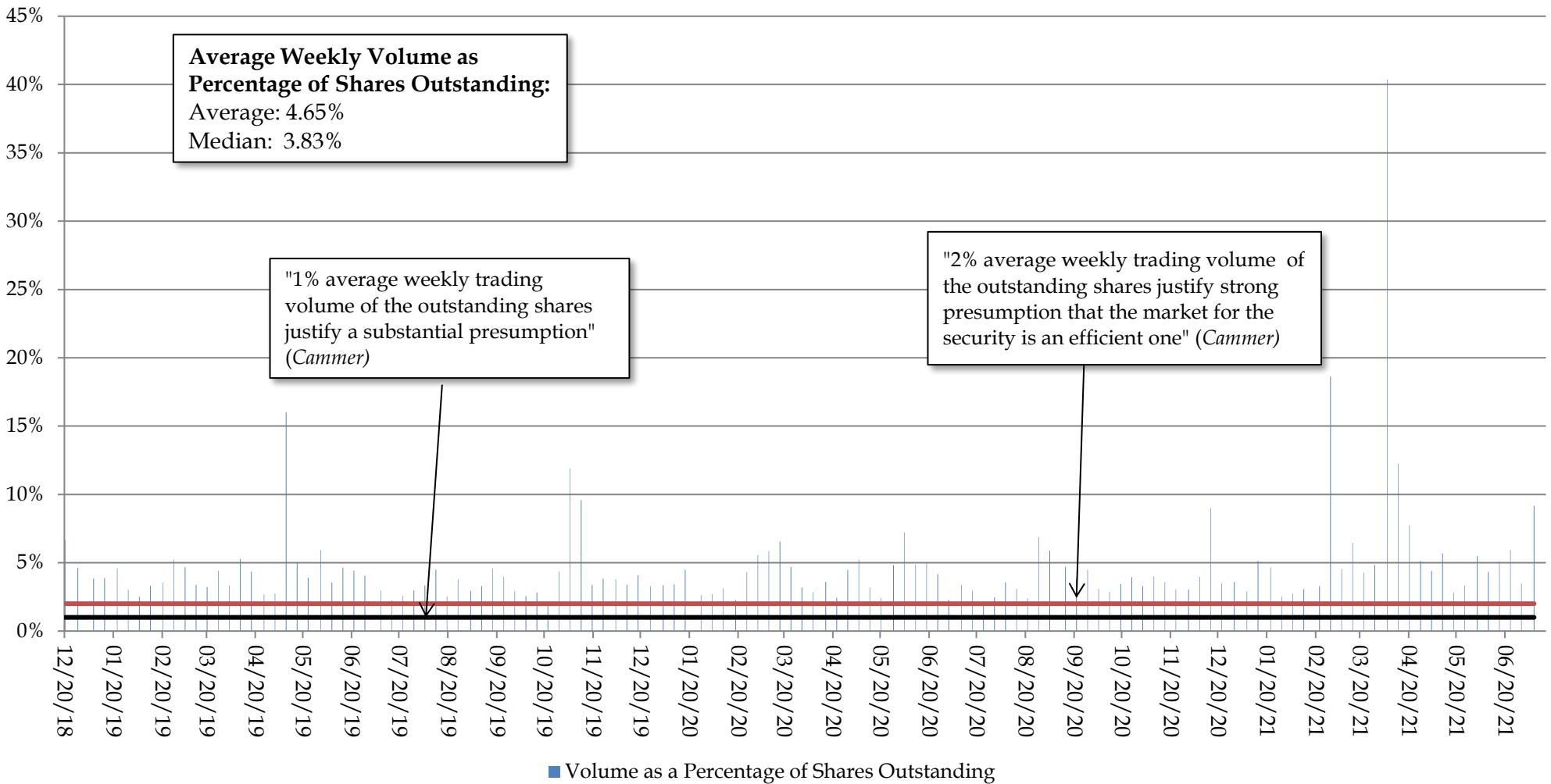
Factor	Summary of Factor	FibroGen Common Stock
Average Weekly Trading Volume Cammer I	"Turnover measured by average weekly trading of 2% or more of the outstanding shares would justify a strong presumption that the market for a security is an efficient one; 1% would justify a substantial presumption."	<ul style="list-style-type: none"> <li>The average weekly trading volume of 4.65%, as a percentage of shares outstanding, exceeds the standard of 2% that courts have suggested would justify a strong presumption of an efficient market (Note: 4.14 million shares traded weekly on average during the Class Period).</li> </ul>
Analyst Coverage Cammer II	"...it would be persuasive to allege a significant number of securities analysts followed and reported on a company's stock during the class period. The existence of such analysts would imply, for example, the [auditor] reports were closely reviewed by investment professionals, who would in turn make buy/sell recommendations to client investors."	<ul style="list-style-type: none"> <li>During the Class Period at least 8 securities analysts issued 111 analyst reports which implies that important information relevant to trading FibroGen Common Stock was widely communicated to the market.</li> </ul>
Market Makers Cammer III	"For over the counter markets without volume reporting, the number of market makers is probably the best single criterion. Ten market makers for a security would justify a substantial presumption that the market for the security is an efficient one; five market makers would justify a more modest presumption."	<ul style="list-style-type: none"> <li>Because FibroGen's shares were exchange-traded on the NASDAQ during the Class Period, not over the counter, this factor is satisfied. According to Bloomberg, throughout the Class Period, there were at least 102 market makers for FibroGen Common Stock.</li> </ul>
SEC Form S-3 Eligibility Cammer IV	"It would be helpful to allege the Company was entitled to file an S-3 Registration Statement in connection with public offerings or, if ineligible, such ineligibility was only because of timing factors rather than because the minimum stock requirements set forth in the instructions to Form S-3 were not met. Again, it is the number of shares traded and value of shares outstanding that involve the facts which imply efficiency."	<ul style="list-style-type: none"> <li>During the Class Period, FibroGen filed a Form S-3ASR (i.e. March 2, 2020). FibroGen also filed Form S-3ASR's before and after the Class Period (i.e. March 1, 2017, and August 8, 2022). I have found no evidence to believe that FibroGen was not S-3 eligible throughout the Class Period, thus satisfying this factor.</li> </ul>
Price Reaction to New Information Cammer V	"...one of the most convincing ways to demonstrate [market] efficiency would be to illustrate, over time, a cause and effect relationship between company disclosures and resulting movements in stock price."	<ul style="list-style-type: none"> <li>The event study demonstrates a clear cause and effect relationship. A statistical test shows a significant contemporaneous relationship between new firm-specific news and significant changes in the market price for FibroGen Common Stock.</li> </ul>
Market Capitalization	Firms with a larger market capitalization tend to have "larger institutional ownership and tend to be listed on the New York Stock Exchange with a greater analyst following."	<ul style="list-style-type: none"> <li>As of 12/31/2018 and 6/30/2021, FibroGen's market capitalization was \$3.95 billion and \$2.47 billion, respectively, which is at least the 67th percentile of all NYSE and NASDAQ stocks. FibroGen Common Stock therefore easily meets this criterion.</li> </ul>
Bid-Ask Spread	The bid-ask spread represents a measure of the cost to transact in a market. Narrow bid-ask spreads indicate less uncertainty regarding valuation and that reasonably sized trades will not substantially impact the market price. Wider bid-ask spreads indicate greater liquidity costs and less ability to trade without moving the market price.	<ul style="list-style-type: none"> <li>During the Class Period, the average percentage bid-ask spread for FibroGen Common Stock in each month ranged from 0.034% to 0.133%. FibroGen's average percentage bid-ask spread was well below the mean and median bid-ask spread of a random sample of 100 other common stocks trading on the NASDAQ and NYSE in April 2020 (the full month when FibroGen had the largest bid-ask spread). This supports a finding of efficiency.</li> </ul>
Float and Institutional Ownership	Institutional investors are considered to be sophisticated, well-informed investors with access to most publicly available information for the stocks that they own.	<ul style="list-style-type: none"> <li>On average over 91.74% of FibroGen shares were held by non-insiders. 472 institutions held the vast majority of the public float throughout the Class Period which further supports the finding that FibroGen Common Stock traded in an efficient market.</li> </ul>
Autocorrelation	If autocorrelation is persistent and sufficiently large that a trader could profit from taking advantage of the autocorrelation, it suggests market inefficiency because past price movements are not fully reflected in the current price.	<ul style="list-style-type: none"> <li>There was no evidence of statistically significant autocorrelation, which means that there was no systematic opportunity for a trader to profit from trading FibroGen Common Stock based solely on its past price movements. This supports a finding of efficiency.</li> </ul>
Options	Empirical analysis has shown that option listings are associated with a decrease in bid-ask spread and increase in quoted depth, trading volume, trading frequency, and transaction size - an overall improvement of the market quality of the underlying stocks.	<ul style="list-style-type: none"> <li>There were 316,541 FibroGen Common Stock put contracts and 416,070 FibroGen Common Stock call contracts that traded during the Class Period. FibroGen Common Stock therefore easily meets this criterion.</li> </ul>

**Exhibit 2**  
**FibroGen Common Stock Price & Volume**  
**12/20/2018 - 7/31/2021**



Sources: Complaint and S&P Capital IQ.

**Exhibit 3**  
**FibroGen Common Stock Average Weekly Trading Volume**  
**as a Percentage of Shares Outstanding**  
**12/20/2018 - 7/15/2021**



Source: S&P Capital IQ.

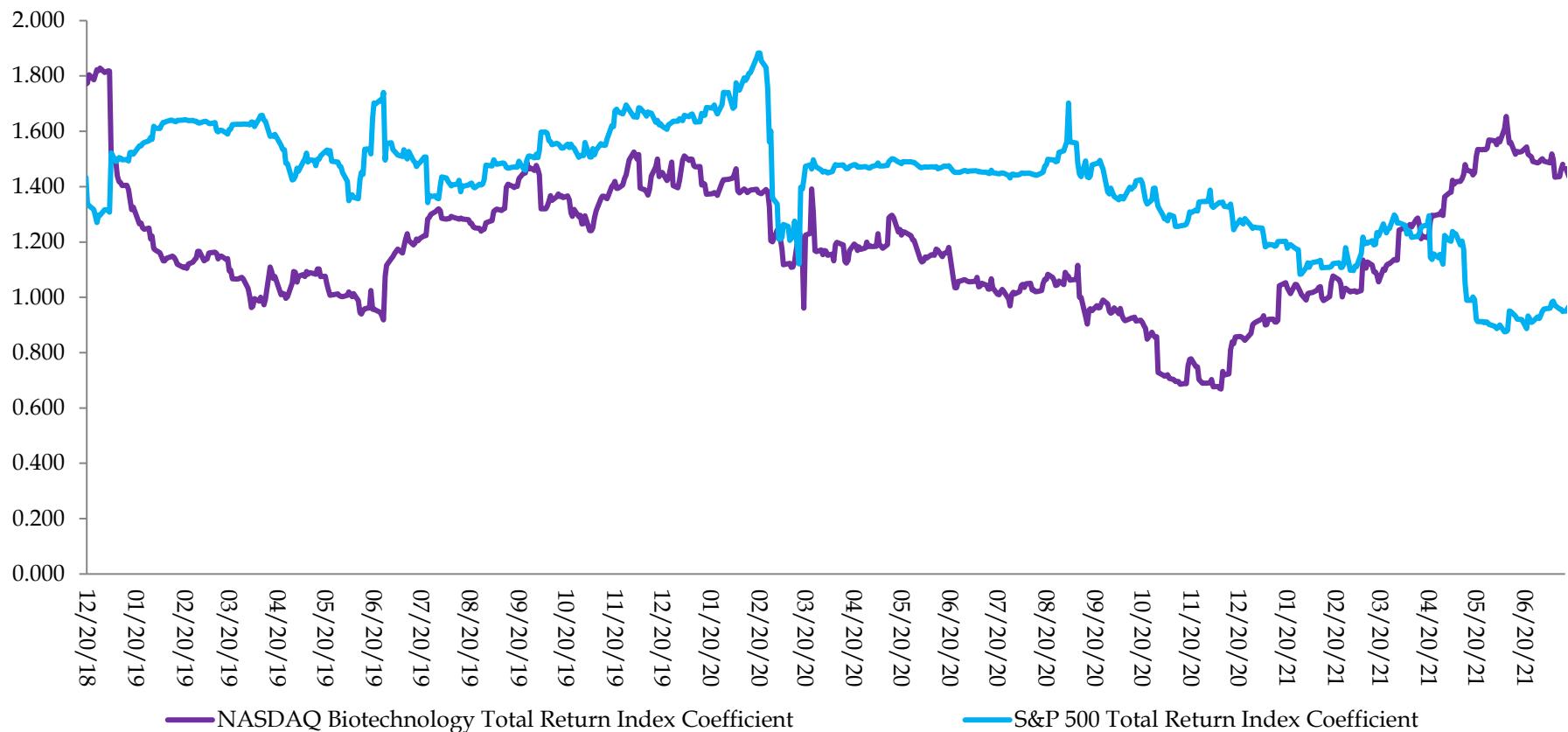
Note: Average weekly trading volume is calculated by analyzing each five consecutive trading days (rather than calendar weeks) starting with the first day of the Class Period on December 20, 2018 through July 15, 2021.

**Exhibit 4**  
**Summary of Securities Analyst Reports Issued for FibroGen**

Analyst Name	Reports Issued During the Class Period: 12/20/2018 - 7/15/2021
[1] JEFFERIES LLC	50
[2] MIZUHO	15
[3] SEEKING ALPHA	11
[4] RAYMOND JAMES & ASSOCIATES	10
[5] WILLIAM BLAIR & COMPANY LLC	9
[6] PIPER Sandler COMPANIES	9
[7] H.C. WAINWRIGHT & CO.	6
[8] CITIGROUP INC.	1
<b>Total</b>	<b>111</b>

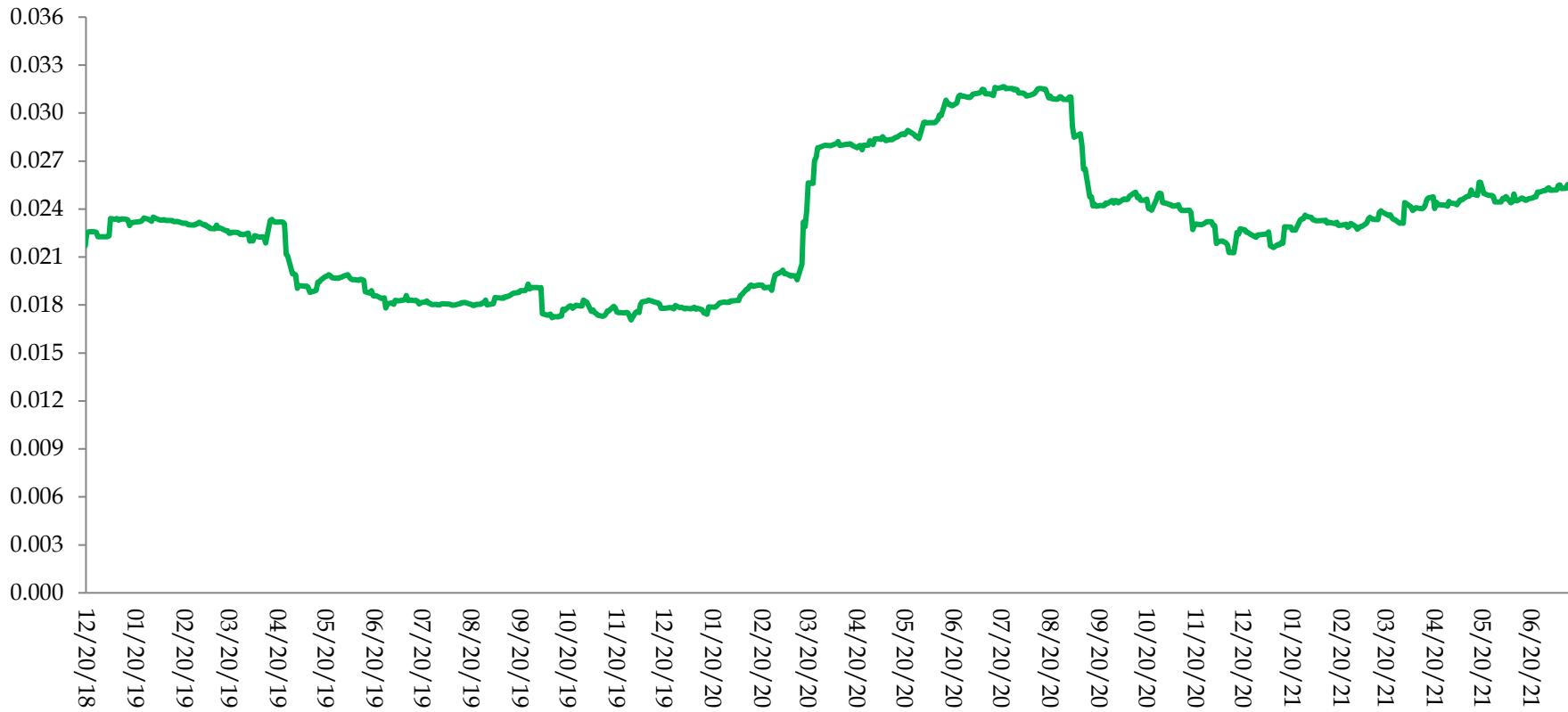
Source: Counsel and Seeking Alpha.

**Exhibit 5**  
**Coefficients from Rolling Event Study Regression for FibroGen**  
**12/20/2018 - 7/15/2021**



Note: The results are based on a rolling regression of the previous 120 trading days. The regression model controls for a broad market index (S&P 500 Total Return Index) and an Industry Index (i.e. the NASDAQ Biotechnology Total Return Index). FibroGen compares their financial performance to the Nasdaq Biotechnology Total Return Index in its 10-Ks during the Class Period (10-K FY 2018 - 2021). The returns of the Industry Index are net of the S&P 500 Total Return Index. Earnings announcements, the alleged corrective disclosure dates identified in the complaint (5/10/2019, 3/2/2021-3/3/2021, 4/7/2021-4/8/2021, and 7/16/2021), all press releases except for non-CEO personnel changes, the announcement of upcoming earnings or conferences, or other clearly immaterial news, and three outlier dates (i.e. 11/4/2019 and 11/5/2019 with regard to volatility following the release of a negative report, and 11/11/2019, continued market reaction to FibroGen's Phase 3 roxadustat results released 11/8/2019) have been removed from the estimation.

**Exhibit 6**  
**Standard Deviation of the Errors for Rolling Event Study**  
**Regression for FibroGen Common Stock**  
**12/20/2018 - 7/15/2021**



Note: The results are based on a rolling regression of the previous 120 trading days. The regression model controls for a broad market index (S&P 500 Total Return Index) and an Industry Index (i.e. the NASDAQ Biotechnology Total Return Index). FibroGen compares their financial performance to the Nasdaq Biotechnology Total Return Index in its 10-Ks during the Class Period (10-K FY 2018 - 2021). The returns of the Industry Index are net of the S&P 500 Total Return Index. Earnings announcements, the alleged corrective disclosure dates identified in the complaint (5/10/2019, 3/2/2021-3/3/2021, 4/7/2021-4/8/2021, and 7/16/2021), all press releases except for non-CEO personnel changes, the announcement of upcoming earnings or conferences, or other clearly immaterial news, and three outlier dates (i.e. 11/4/2019 and 11/5/2019 with regard to volatility following the release of a negative report, and 11/11/2019, continued market reaction to FibroGen's Phase 3 roxadustat results released 11/8/2019) have been removed from the estimation.

**Exhibit 7**  
**Analysis of FibroGen Press Releases During the Class Period**

#	Date	Time	Market Date	Event	Category	Headline	Closing Price	Raw Return	Abnormal Return	Abnormal Dollar Change	t-Stat	P-Value	Sig Level
1	12/20/2018	7:00 AM	12/20/2018	Press Release	Drug Development	FibroGen Announces Positive Topline Results from Three Global Phase 3 Trials of Roxadustat for Treatment of Anemia in Patients with Chronic Kidney Disease <i>Source -GlobeNewswire</i>	\$42.43	4.12%	6.87%	\$2.80	3.05	0.00	***
2	2/27/2019	4:07 PM	2/28/2019	Q4 2018 Earnings	Earnings	FibroGen Reports Fourth Quarter and Full Year 2018 Financial Results <i>Source -GlobeNewswire</i>	\$57.80	-1.47%	0.12%	\$0.07	0.05	0.96	
3	4/15/2019	7:00 AM	4/15/2019	Press Release	Drug Development	FibroGen Receives Orphan Drug Designation from the U.S. FDA For Pamrevlumab for the Treatment of Duchenne Muscular Dystrophy <i>Source -GlobeNewswire</i>	\$48.76	1.52%	2.18%	\$1.05	0.94	0.35	
4	5/9/2019	4:44 PM	5/10/2019	Press Release	Drug Development	FibroGen Announces Positive Topline Results from Pooled Safety Analyses of Roxadustat Global Phase 3 Program <i>Source -GlobeNewswire</i>	\$36.39	-20.32%	-20.02%	-\$9.14	-10.65	0.00	***
5	5/9/2019	4:45 PM	5/10/2019	Q1 2019 Earnings	Earnings	FibroGen Reports First Quarter 2019 Financial Results <i>Source -GlobeNewswire</i>	\$36.39	-20.32%	-20.02%	-\$9.14	-10.65	0.00	***
6	6/28/2019	7:00 AM	6/28/2019	Press Release	Conference	FibroGen to Present Interim Phase 2 Data on Pamrevlumab in Subjects with Duchenne Muscular Dystrophy at the Parent Project Muscular Dystrophy 2019 Annual Conference <i>Source -GlobeNewswire</i>	\$45.18	1.41%	-0.75%	-\$0.34	-0.42	0.68	
7	7/22/2019	7:00 AM	7/22/2019	Press Release	Drug Development	FibroGen Announces First Patient Dosed in ZEPHYRUS, a Phase 3 Clinical Trial of Pamrevlumab for the Treatment of Patients with Idiopathic Pulmonary Fibrosis <i>Source -GlobeNewswire</i>	\$47.76	3.31%	2.88%	\$1.33	1.58	0.12	
7	7/24/2019	6:53 PM	7/25/2019	Press Release	Drug Development	The New England Journal of Medicine (NEJM) Publishes Roxadustat China Phase 3 Results for the Treatment of Anemia in Chronic Kidney Disease Patients Receiving Dialysis <i>Source -GlobeNewswire</i>	\$46.70	-0.85%	0.90%	\$0.42	0.50	0.62	
8	8/8/2019	4:05 PM	8/9/2019	Q2 2019 Earnings	Earnings	FibroGen Reports Second Quarter 2019 Financial Results <i>Source -GlobeNewswire</i>	\$46.20	-0.65%	0.00%	\$0.00	0.00	1.00	
9	8/21/2019	4:10 PM	8/22/2019	Press Release	Drug Development	Roxadustat Approved in China for Treatment of Anemia in Chronic Kidney Disease Patients Not Receiving Dialysis <i>Source -GlobeNewswire</i>	\$43.53	-2.99%	-1.79%	-\$0.80	-1.00	0.32	

**Exhibit 7**  
**Analysis of FibroGen Press Releases During the Class Period**

#	Date	Time	Market Date	Event	Category	Headline	Closing Price	Raw Return	Abnormal Return	Abnormal Dollar Change	t-Stat	P-Value	Sig Level
10	8/26/2019	8:30 AM	8/26/2019	Press Release	Personnel Changes	FibroGen Announces Passing of CEO Thomas B. Neff, Scientific Innovator and Pioneering Biopharmaceutical Executive <i>Source -GlobeNewswire</i>	\$44.80	7.38%	6.07%	\$2.53	3.37	0.00	***
11	9/20/2019	3:05 AM	9/20/2019	Press Release	Drug Development	Roxadustat Approved in Japan for the Treatment of Anemia Associated with Chronic Kidney Disease in Dialysis Patients <i>Source -GlobeNewswire</i>	\$39.90	0.63%	-0.41%	-\$0.16	-0.21	0.83	
12	9/26/2019	7:00 AM	9/26/2019	Press Release	Drug Development	FibroGen Announces Initiation of Phase 2 Clinical Trial of Roxadustat for the Treatment of Anemia in Cancer Patients Receiving Chemotherapy <i>Source -GlobeNewswire</i>	\$37.77	-1.14%	1.78%	\$0.68	0.94	0.35	
13	9/30/2019	7:00 AM	9/30/2019	Press Release	Drug Development	FibroGen Announces Publication in the Lancet Respiratory Medicine of Positive Pamrevlumab Efficacy and Safety Data for the Praise Phase 2 Study in Idiopathic Pulmonary Fibrosis <i>Source -GlobeNewswire</i>	\$36.98	-2.17%	-2.69%	-\$1.02	-1.41	0.16	
14	10/23/2019	7:00 AM	10/23/2019	Press Release	Drug Development	FibroGen Announces First Patient Dosed in LAPIS, a Phase 3 Clinical Trial of Pamrevlumab for the Treatment of Patients With Locally Advanced Pancreatic Cancer <i>Source -GlobeNewswire</i>	\$38.83	-1.97%	-2.38%	-\$0.94	-1.34	0.18	
15	11/7/2019	4:39 PM	11/8/2019	Press Release	Drug Development	FibroGen Presents Phase 3 Efficacy and Safety Results for Roxadustat Versus Epoetin Alfa as Treatment of Anemia in Incident Dialysis Patients with Chronic Kidney Disease <i>Source -GlobeNewswire</i>	\$41.62	9.61%	6.97%	\$2.65	4.01	0.00	***
	11/8/2019	2:10 PM	11/8/2019	Press Release	Drug Development	FibroGen Announces Positive Phase 3 Pooled Roxadustat Safety and Efficacy Results for Treatment of Anemia in Chronic Kidney Disease <i>Source -GlobeNewswire</i>	\$41.62	9.61%	6.97%	\$2.65	4.01	0.00	***
16	11/11/2019	4:01 PM	11/12/2019	Q3 2019 Earnings	Earnings	FibroGen Reports Third Quarter 2019 Financial Results <i>Source -GlobeNewswire</i>	\$35.56	0.45%	-0.13%	-\$0.05	-0.07	0.94	
17	12/2/2019	7:00 AM	12/2/2019	Press Release	Drug Development	FibroGen Announces Roxadustat Inclusion in China's National Reimbursement Drug List <i>Source -GlobeNewswire</i>	\$44.00	3.85%	5.58%	\$2.36	3.18	0.00	***
18	12/23/2019	7:00 AM	12/23/2019	Press Release	Drug Development	FibroGen Submits New Drug Application to the U.S. FDA for Roxadustat in Patients With Anemia of Chronic Kidney Disease <i>Source -GlobeNewswire</i>	\$44.92	-0.84%	-1.74%	-\$0.79	-0.98	0.33	
19	1/6/2020	7:00 AM	1/6/2020	Press Release	Personnel Changes	FibroGen Names Enrique Conterno as Chief Executive Officer <i>Source -GlobeNewswire</i>	\$43.35	0.60%	-0.37%	-\$0.16	-0.21	0.83	

**Exhibit 7**  
**Analysis of FibroGen Press Releases During the Class Period**

#	Date	Time	Market Date	Event	Category	Headline	Closing Price	Raw Return	Abnormal Return	Abnormal Dollar Change	t-Stat	P-Value	Sig Level
20	1/30/2020	12:01 AM	1/30/2020	Press Release	Drug Development	Astellas Submits Supplemental New Drug Application for Approval of Evrenzo® (roxadustat) for the Treatment of Anemia Associated with Chronic Kidney Disease in Non-Dialysis Dependent Patients in Japan <i>Source -PRNewswire</i>	\$42.28	0.57%	2.74%	\$1.15	1.51	0.13	
21	2/11/2020	5:00 PM	2/12/2020	Press Release	Drug Development	FibroGen Announces U.S. FDA Acceptance of New Drug Application for Roxadustat for the Treatment of Anemia of Chronic Kidney Disease <i>Source -GlobeNewswire</i>	\$45.36	1.64%	1.30%	\$0.58	0.68	0.50	
22	3/2/2020	4:01 PM	3/3/2020	Q4 2019 Earnings	Earnings	FibroGen Reports Fourth Quarter and Full Year 2019 Financial Results <i>Source -GlobeNewswire</i>	\$39.46	-8.55%	-5.49%	-\$2.37	-2.73	0.01	***
23	4/20/2020	7:00 AM	4/20/2020	Press Release	Drug Development	FibroGen Reports UK Court Ruling <i>Source -GlobeNewswire</i>	\$38.50	-3.00%	-4.18%	-\$1.66	-1.50	0.14	
24	5/7/2020	4:01 PM	5/8/2020	Q1 2020 Earnings	Earnings	FibroGen Reports First Quarter 2020 Financial Results <i>Source -GlobeNewswire</i>	\$36.42	0.00%	-1.50%	-\$0.55	-0.53	0.60	
25	5/21/2020	7:00 AM	5/21/2020	Press Release	Drug Development	European Medicines Agency Accepts Astellas' Marketing Authorization Application for Roxadustat <i>Source -GlobeNewswire</i>	\$36.58	-2.69%	-1.03%	-\$0.39	-0.36	0.72	
26	6/8/2020	7:00 AM	6/8/2020	Press Release	Drug Development	FibroGen Announces First Patient Enrolled in Pamrevlumab Clinical Trial in Patients Hospitalized in Italy with Severe COVID-19 <i>Source -GlobeNewswire</i>	\$33.61	2.97%	1.44%	\$0.47	0.49	0.63	
27	6/8/2020	5:00 PM	6/9/2020	Press Release	Drug Development	FibroGen Announces New Roxadustat Data Presented at 2020 ERA-EDTA Virtual Congress <i>Source -GlobeNewswire</i>	\$35.79	6.49%	7.25%	\$2.44	2.46	0.02	**
28	6/23/2020	7:00 AM	6/23/2020	Press Release	Drug Development	FibroGen Announces First Patient Enrolled in Pamrevlumab Clinical Trial in Patients Hospitalized in U.S. with Acute COVID-19 <i>Source -GlobeNewswire</i>	\$42.81	1.73%	1.13%	\$0.48	0.36	0.72	
29	8/6/2020	4:02 PM	8/7/2020	Q2 2020 Earnings	Earnings	FibroGen Reports Second Quarter 2020 Financial Results <i>Source -GlobeNewswire</i>	\$44.20	6.63%	7.07%	\$2.93	2.27	0.03	**
30	8/11/2020	7:00 AM	8/11/2020	Press Release	Drug Development	FibroGen Announces First Patient Enrolled in Pamrevlumab Phase 3 Clinical Trial in Patients with Duchenne Muscular Dystrophy <i>Source -GlobeNewswire</i>	\$45.03	-0.27%	2.39%	\$1.08	0.76	0.45	

**Exhibit 7**  
**Analysis of FibroGen Press Releases During the Class Period**

#	Date	Time	Market Date	Event	Category	Headline	Closing Price	Raw Return	Abnormal Return	Abnormal Dollar Change	t-Stat	P-Value	Sig Level
31	10/22/2020	10:08 AM	10/22/2020	Press Release	Conference	FibroGen Presents Late-Breaker Abstract Results on Associations between Hemoglobin Levels and Cardiovascular Outcomes in Roxadustat-Treated Patients with Anemia of Chronic Kidney Disease (CKD) <i>Source -GlobeNewswire</i>	\$45.61	1.13%	-0.26%	-\$0.12	-0.11	0.91	
32	11/5/2020	4:01 PM	11/6/2020	Q3 2020 Earnings	Earnings	FibroGen Reports Third Quarter 2020 Financial Results <i>Source -GlobeNewswire</i>	\$41.28	-2.78%	-1.56%	-\$0.66	-0.65	0.52	
33	11/27/2020	7:00 AM	11/27/2020	Press Release	Drug Development	Astellas Receives Approval of EVRENZO® (roxadustat) in Japan for the Treatment of Anemia of Chronic Kidney Disease in Adult Patients Not on Dialysis <i>Source -GlobeNewswire</i>	\$40.17	0.37%	-1.89%	-\$0.76	-0.81	0.42	
34	12/18/2020	4:59 PM	12/21/2020	Press Release	Drug Development	FibroGen Provides Regulatory Update on Roxadustat <i>Source -GlobeNewswire</i>	\$40.01	-9.01%	-9.13%	-\$4.02	-4.02	0.00	***
35	12/22/2020	7:00 AM	12/22/2020	Press Release	Drug Development	FibroGen Advances Phase 3 Clinical Development of Pamrevlumab for the Treatment of Idiopathic Pulmonary Fibrosis with Initiation of ZEPHYRUS-2 <i>Source -GlobeNewswire</i>	\$40.45	1.10%	1.09%	\$0.44	0.48	0.63	
36	3/1/2021	4:01 PM	3/2/2021	Q4 2020 Earnings	Earnings	FibroGen Reports Fourth Quarter and Full Year 2020 Financial Results <i>Source -GlobeNewswire</i>	\$38.07	-24.66%	-22.64%	-\$11.44	-9.96	0.00	***
37	3/16/2021	7:00 AM	3/16/2021	Press Release	Drug Development	FibroGen Provides Regulatory Update on Roxadustat <i>Source -GlobeNewswire</i>	\$38.07	-24.66%	-22.64%	-\$11.44	-9.96	0.00	***
38	4/6/2021	4:01 PM	4/7/2021	Press Release	Drug Development	FibroGen Initiates LELANTOS-2 – Second Phase 3 Clinical Study of Pamrevlumab for the Treatment of Duchenne Muscular Dystrophy <i>Source -GlobeNewswire</i>	\$33.50	-1.76%	-1.78%	-\$0.61	-0.75	0.46	
39	4/6/2021	7:50 PM	4/7/2021	Press Release	Drug Development	FibroGen Provides Additional Information on Roxadustat <i>Source -GlobeNewswire</i>	\$19.74	-43.01%	-40.88%	-\$14.16	-17.04	0.00	***
						FibroGen Announces FDA Advisory Committee to Review Roxadustat New Drug Application Tentatively Scheduled for July 15, 2021 <i>Source -GlobeNewswire</i>	\$19.74	-43.01%	-40.88%	-\$14.16	-17.04	0.00	***
						FibroGen Receives Fast Track Designation from the U.S. FDA for Pamrevlumab for the Treatment of Duchenne Muscular Dystrophy <i>Source -GlobeNewswire</i>	\$19.89	7.11%	8.85%	\$1.64	3.68	0.00	***

**Exhibit 7**  
**Analysis of FibroGen Press Releases During the Class Period**

#	Date	Time	Market Date	Event	Category	Headline	Closing Price	Raw Return	Abnormal Return	Abnormal Dollar Change	t-Stat	P-Value	Sig Level
40	4/15/2021	7:00 AM	4/15/2021	Press Release	Drug Development	FibroGen Receives Rare Pediatric Disease Designation from the U.S. FDA for Pamrevlumab for the Treatment of Duchenne Muscular Dystrophy <i>Source -GlobeNewswire</i>	\$19.30	0.21%	-1.39%	-\$0.27	-0.56	0.57	
41	5/10/2021	4:01 PM	5/11/2021	Q1 2021 Earnings	Earnings	FibroGen Reports First Quarter 2021 Financial Results <i>Source -GlobeNewswire</i>	\$20.15	3.76%	2.61%	\$0.51	1.05	0.29	
42	6/16/2021	8:00 AM	6/16/2021	Press Release	Drug Development	Pamrevlumab Included in Pancreatic Cancer Action Network's Adaptive Clinical Trial Platform <i>Source -GlobeNewswire</i>	\$25.84	1.81%	2.24%	\$0.57	0.91	0.36	
43	6/17/2021	7:00 AM	6/17/2021	Press Release	Drug Development	FibroGen and HiFiBiO Announce Transformative Partnership to Advance Next-Generation Therapies for Patients with Cancer and Autoimmune Disease <i>Source -GlobeNewswire</i>	\$26.29	1.74%	0.29%	\$0.08	0.12	0.91	
44	6/25/2021	9:15 AM	6/25/2021	Press Release	Drug Development	Astellas Receives Positive CHMP Opinion for EVRENZO™ (roxadustat) for Adult Patients with Symptomatic Anemia of Chronic Kidney Disease <i>Source -GlobeNewswire</i>	\$27.67	-4.88%	-6.37%	-\$1.85	-2.54	0.01	**

Sources: S&P Capital IQ and Factiva.

Notes:

(1) The results are based on a rolling regression of the previous 120 trading days. The regression model controls for a broad market index (S&P 500 Total Return Index) and an Industry Index (i.e. the NASDAQ Biotechnology Total Return Index). FibroGen compares their financial performance to the Nasdaq Biotechnology Total Return Index in its 10-Ks during the Class Period (10-K FY 2018 - 2021). The returns of the Industry Index are net of the S&P 500 Total Return Index. Earnings announcements, the alleged corrective disclosure dates identified in the complaint (5/10/2019, 3/2/2021-3/3/2021, 4/7/2021-4/8/2021, and 7/16/2021), all press releases except for non-CEO personnel changes, the announcement of upcoming earnings or conferences, or other clearly immaterial news, and three outlier dates (i.e. 11/4/2019 and 11/5/2019 with regard to volatility following the release of a negative report, and 11/11/2019, continued market reaction to FibroGen's Phase 3 roxadustat results released 11/8/2019) have been removed from the estimation.

(2) "\*\*\*\*" Denotes statistical significance at the 99% confidence level or greater. "\*\*\*" Denotes statistical significance at the 95% confidence level or greater. "\*\*" Denotes statistical significance at the 90% confidence level or greater.

**Exhibit 8**  
**Comparison of Statistical Results for FibroGen Earnings  
Announcements and Other Press Releases  
vs. Days with No News during the Class Period**

Statistic	Earnings Announcements & Press Releases	Days with No News, Analyst Reports, or SEC Filings
N <sup>(1)</sup>	44	217
Significant Days at 95% Confidence Level	13	8
% Significant Days at 95% Confidence Level <sup>(2)</sup>	29.55%	3.69%
Average Absolute Abnormal Return <sup>(3)</sup>	4.55%	1.53%
Average Volume (Millions) <sup>(4)</sup>	2.1	0.6

Notes:

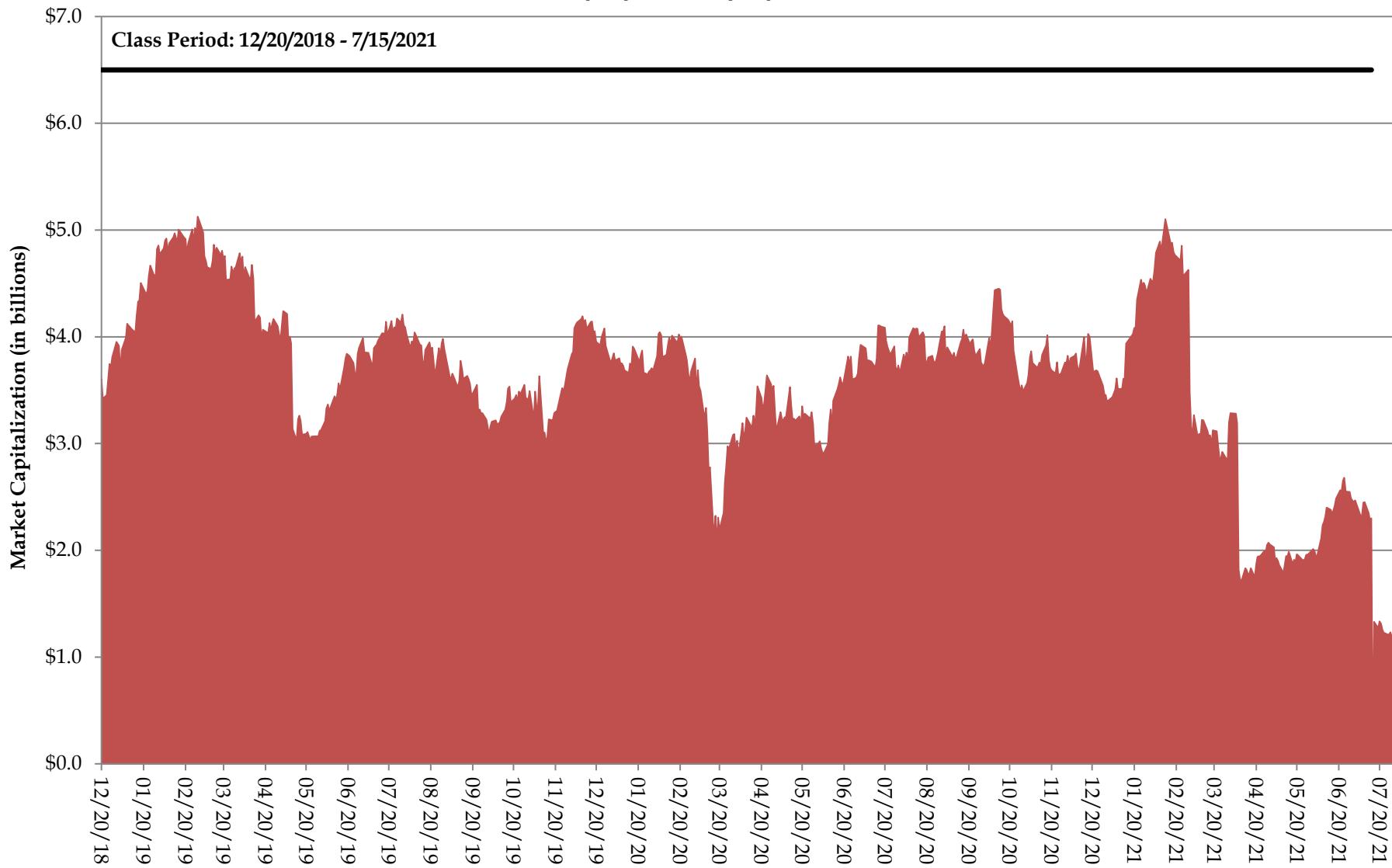
(1) Results are based on the Class Period. For the purposes of this analysis, I selected the 217 days with no news. Days with no news were days that had zero news articles via the Factiva database, and no analyst reports or SEC filings were issued. If on a date, with otherwise no FibroGen related news, an analyst report is issued about FibroGen's roxadustat development partners, AstraZeneca and/or Astellas, and mentions roxadustat, I no longer consider that date a "no news" date.

(2) 29.55% rate of statistical significance is statistically significantly different than 3.69% at the 99% confidence level using either a Chi-Square test or Fisher's Exact test.

(3) 4.55% absolute return is statistically significantly different than 1.53% based on a t-test for difference of means at the 99% confidence level.

(4) The difference between 2.1 million and 0.6 million is statistically significant at the 99% confidence level.

**Exhibit 9**  
**FibroGen Common Stock Market Capitalization**  
**12/20/2018 - 7/31/2021**



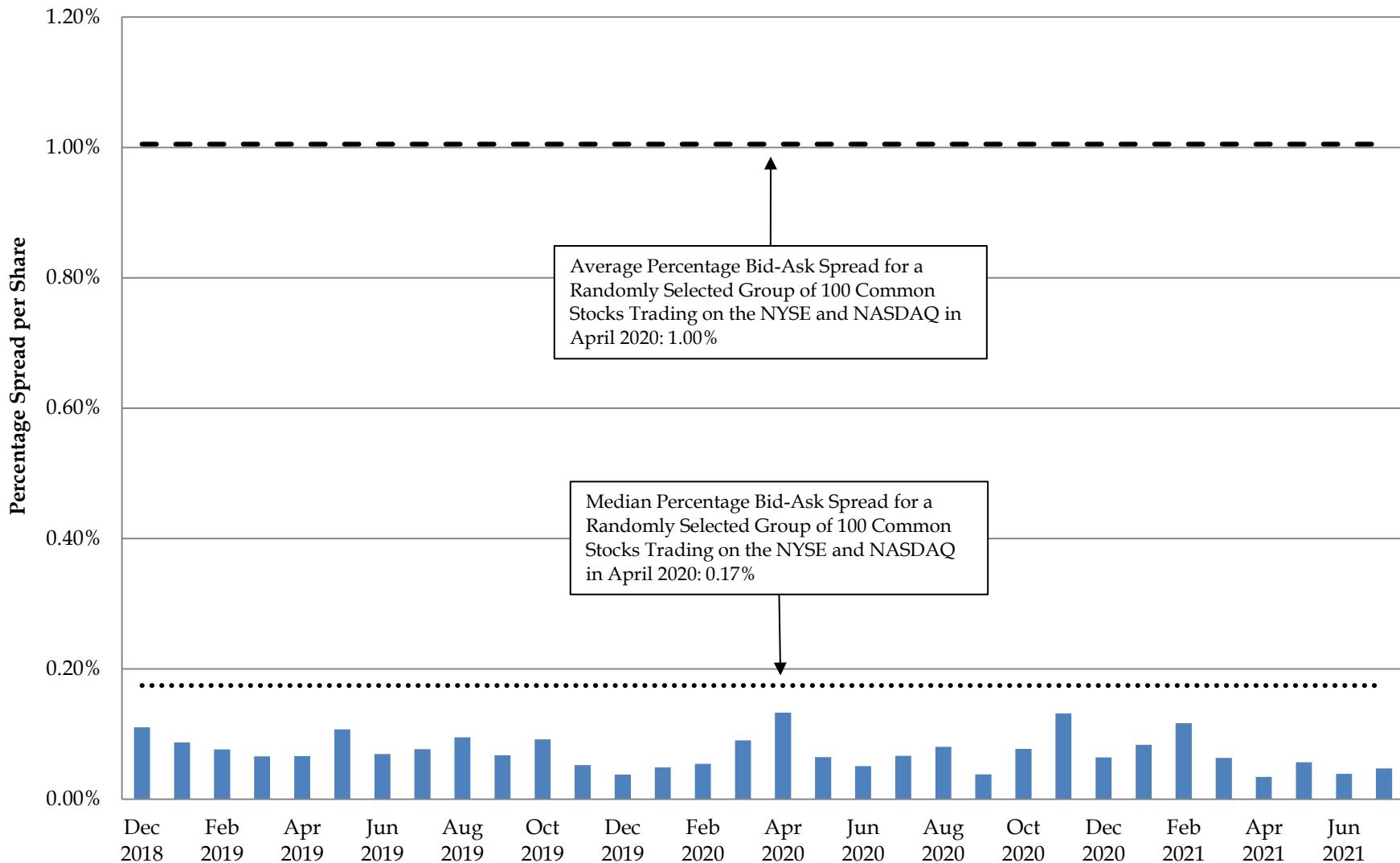
Sources: Complaint and S&P Capital IQ.

**Exhibit 10**  
**FibroGen Common Stock**  
**Market Capitalization Rankings**

Last trading day of:	Market Capitalization (billions)	Percentile Rank on NYSE & NASDAQ
Q4 2018	\$3.95	80%
Q1 2019	\$4.65	80%
Q2 2019	\$3.90	77%
Q3 2019	\$3.23	75%
Q4 2019	\$3.76	76%
Q1 2020	\$3.09	79%
Q2 2020	\$3.66	77%
Q3 2020	\$3.74	77%
Q4 2020	\$3.39	73%
Q1 2021	\$3.20	71%
Q2 2021	\$2.47	67%

Source: Bloomberg and S&P Capital IQ.

**Exhibit 11**  
**FibroGen Common Stock Average Monthly Bid-Ask Percentage Spread**  
**12/20/2018 - 7/15/2021**



Source: Thomson Reuters Eikon and TICK Data.

Note: December 2018 and July 2021 data are limited to the Class Period.

**Exhibit 12**  
**FibroGen Common Stock Shares Outstanding, Insider Holdings, and Institutional Holdings**

Date	Shares Outstanding (in 000s)	Total Institutions Owning Stock	Insider Holdings (in 000s)	Short Interest (in 000s)	Public Float (in 000s)	Insider Holdings % of Shares Outstanding	Total Institutional Holdings (in 000s)	Institutional Holdings % of Shares Outstanding	Institutional Holdings % of Public Float	
	[1]	[2]	[3]	[4]	[5]	[6] = [2] + [5] - [4]	[7] = [4] / [2]	[8]	[9] = [8] / [2]	[10] = [8] / [6]
12/31/2018	85,432	262	8,680	2,382	79,134	10.16%	57,306	67%	72%	
3/31/2019	85,562	282	8,634	3,851	80,780	10.09%	58,448	68%	72%	
6/30/2019	86,222	249	8,827	5,438	82,833	10.24%	62,523	73%	75%	
9/30/2019	87,211	264	8,711	4,795	83,295	9.99%	62,025	71%	74%	
12/31/2019	87,657	272	6,473	5,170	86,355	7.38%	62,560	71%	72%	
3/31/2020	88,896	249	6,409	5,496	87,983	7.21%	65,884	74%	75%	
6/30/2020	90,228	253	6,509	6,585	90,304	7.21%	68,588	76%	76%	
9/30/2020	90,885	262	6,513	6,906	91,278	7.17%	70,121	77%	77%	
12/31/2020	91,441	262	6,514	7,210	92,137	7.12%	72,581	79%	79%	
3/31/2021	92,080	255	6,588	8,505	93,997	7.15%	71,485	78%	76%	
6/30/2021	92,609	226	6,628	8,526	94,507	7.16%	68,462	74%	72%	
<b>Total Institutions over Class Period:</b>				<b>472</b>			<b>Class Period Average:</b>	<b>8.26%</b>	<b>73.51%</b>	<b>74.74%</b>

Sources: S&P Capital IQ and SEC filings.

**Exhibit 13**  
**FibroGen Common Stock**  
**Test for Autocorrelation During the Class Period**

Quarter	Coefficient on Previous Day's Abnormal Return <sup>(1)</sup>	t-Statistic	Sig Level
Q4 2018	0.42	1.23	
Q1 2019	0.14	1.06	
Q2 2019	-0.02	-0.16	
Q3 2019	-0.12	-0.95	
Q4 2019	-0.24	-1.99	*
Q1 2020	0.06	0.47	
Q2 2020	0.05	0.37	
Q3 2020	0.06	0.45	
Q4 2020	0.01	0.07	
Q1 2021	0.21	1.55	
Q2 2021	0.12	0.97	
Q3 2021	-0.08	-0.20	
<b>Class Period</b>	<b>0.06</b>	<b>1.65</b>	

Source: S&P Capital IQ.

Notes:

(1) For each quarter I perform a regression with the abnormal return from the event study as the dependent variable and the previous day's abnormal return as the independent variable.

## Exhibit 14

### Summary of Put-Call Parity Test

Option-Date Pairs	50,502
Violations of Put-Call Parity	10
Violations as % of Total Observations	0.02%
<hr/>	
<b>Constraints:</b>	$S_0 - D - K \leq C_{ask} - P_{bid}$
	$C_{bid} - P_{ask} \leq S_0 - Ke^{-rT}$

Sources: iVolatility.com and S&P Capital IQ.

Notes:

- (1) The ask price for the Call option and the bid price for the Put option was used for the lower bound; and the bid price for the Call and the ask price for the Put option was used for the upper bound in the inequality above.
- (2) If the mean price from iVolatility was 0, I used the midpoint between the bid price and ask price.
- (3) Note that Fibrogen did not issue dividends during the Class Period, so there is no adjustment made for dividends.

Definition of Variables:

$S_0$  Current stock price for Fibrogen (no adjustment for dividends - none were issued).

$D$  Present Value of future dividends (if applicable), calculated as:

$$\sum_{j=1}^n \frac{D_j}{(1 + r)^{T_j}}$$

where  $D_j$  is the dividend amount,  $r$  is the risk-free (and constant) interest rate covering the life of the option and ending closest to the expiration date, and  $T_j$  time until dividend payout expressed in years, and  $n$  is the number of dividend payments expected before option expiration. Note that no dividends were issued by Fibrogen.

$K$  Strike price of the option.

$C$  Call price.

$P$  Put price.

$r$  Risk-free (and constant) interest rate covering the life of the option and ending closest to the expiration date.

$T$  Time until expiration expressed in years.

**Exhibit 15**  
**Summary of Event Study Results for FibroGen Options on Earnings Announcement Dates**

#	Market Date	Event	Common Stock Event Study			Call Option Event Studies						Put Option Event Studies					
			Abnormal Return	t-Stat	Sig Level	Total Number of Series with a Return	Series Statistically Significant at 90%	Series Statistically Significant at 95%	Series Statistically Significant at 99%	Percent of Series Statistically Sig 95% or Above	Total Number of Series with a Return	Series Statistically Significant at 90%	Series Statistically Significant at 95%	Series Statistically Significant at 99%	Percent of Series Statistically Sig 95% or Above		
1	12/20/2018	Press Release	6.87%	3.05	***	31	4	2	15	54.8%	36	3	5	22	75.0%		
2	2/28/2019	Q4 2018 Earnings	0.12%	0.05		48	0	0	0	0.0%	38	8	4	2	15.8%		
3	4/15/2019	Press Release	2.18%	0.94		42	4	2	4	14.3%	38	1	1	0	2.6%		
4	5/10/2019	Press Release & Q1 2019 Earnings	-20.02%	-10.65	***	28	0	0	28	100.0%	39	0	0	32	82.1%		
5	6/28/2019	Press Release	-0.75%	-0.42		52	1	2	1	5.8%	46	0	1	1	4.3%		
6	7/22/2019	Press Release	2.88%	1.58		51	1	0	0	0.0%	47	8	1	0	2.1%		
7	7/25/2019	Press Releases	0.90%	0.50		59	4	0	0	0.0%	57	4	3	1	7.0%		
8	8/9/2019	Q2 2019 Earnings	0.00%	0.00		57	1	2	0	3.5%	55	1	2	1	5.5%		
9	8/22/2019	Press Release	-1.79%	-1.00		55	1	7	0	12.7%	55	2	2	2	7.3%		
10	8/26/2019	Press Release	6.07%	3.37	***	56	0	5	49	96.4%	56	2	8	11	33.9%		
11	9/20/2019	Press Release	-0.41%	-0.21		46	2	0	1	2.2%	47	0	0	0	0.0%		
12	9/26/2019	Press Release	1.78%	0.94		44	3	2	0	4.5%	47	0	0	0	0.0%		
13	9/30/2019	Press Release	-2.69%	-1.41		42	0	2	2	9.5%	47	2	2	0	4.3%		
14	10/23/2019	Press Release	-2.38%	-1.34		48	2	1	0	2.1%	50	6	8	10	36.0%		
15	11/8/2019	Press Releases	6.97%	4.01	***	46	3	8	10	39.1%	48	7	6	29	72.9%		
16	11/12/2019	Q3 2019 Earnings	-0.13%	-0.07		42	4	4	6	23.8%	48	6	3	5	16.7%		
17	12/2/2019	Press Release	5.58%	3.18	***	41	5	16	3	46.3%	38	1	4	7	28.9%		
18	12/23/2019	Press Release	-1.74%	-0.98		40	3	2	0	5.0%	30	0	4	0	13.3%		
19	1/6/2020	Press Release	-0.37%	-0.21		42	1	3	1	9.5%	33	0	0	0	0.0%		
20	1/30/2020	Press Release	2.74%	1.51		39	4	9	5	35.9%	34	2	1	1	5.9%		
21	2/12/2020	Press Release	1.30%	0.68		40	3	7	0	17.5%	32	1	1	1	6.3%		
22	3/3/2020	Q4 2019 Earnings	-5.49%	-2.73	***	44	6	5	0	11.4%	45	5	10	1	24.4%		
23	4/20/2020	Press Release	-4.18%	-1.50		64	1	0	0	0.0%	61	7	8	5	21.3%		
24	5/8/2020	Q1 2020 Earnings	-1.50%	-0.53		68	2	0	1	1.5%	70	3	0	1	1.4%		
25	5/21/2020	Press Release	-1.03%	-0.36		73	1	1	0	1.4%	76	1	4	0	5.3%		
26	6/8/2020	Press Release	1.44%	0.49		58	5	5	2	12.1%	73	1	3	0	4.1%		
27	6/9/2020	Press Release	7.25%	2.46	**	63	3	6	16	34.9%	74	8	16	7	31.1%		

**Exhibit 15**  
**Summary of Event Study Results for FibroGen Options on Earnings Announcement Dates**

#	Market Date	Common Stock Event Study			Call Option Event Studies						Put Option Event Studies						Put Option Event Studies								
		Event	Abnormal Return	t-Stat	Sig Level	Total Number of Series with a Return			Series Statistically Significant at 90%			Series Statistically Significant at 95%			Series Statistically Significant at 99%			Percent of Series Statistically Sig 95% or Above	Total Number of Series with a Return			Series Statistically Significant at 90%			Percent of Series Statistically Sig 95% or Above
						71	0	1	0	14	35	63.6%	65	4	2	1	4.6%		61	7	6	22	8	46.2%	
28	6/23/2020	Press Release	1.13%	0.36		71	0	1	0	14	35	63.6%	65	4	2	1	4.6%								
29	8/7/2020	Q2 2020 Earnings	7.07%	2.27	**	77	4	14	35	63.6%	65	6	22	8									46.2%		
30	8/11/2020	Press Release	2.39%	0.76		77	0	1	1	2.6%	61	7	6	2	0	1	13.1%								
31	10/22/2020	Press Release	-0.26%	-0.11		69	0	3	3	8.7%	53	3	2	0	1	0	3.8%								
32	11/6/2020	Q3 2020 Earnings	-1.56%	-0.65		69	0	0	0	0.0%	61	0	1	1	1	1	3.3%								
33	11/27/2020	Press Release	-1.89%	-0.81		62	4	1	4	8.1%	52	0	1	1	2	2	5.8%								
34	12/21/2020	Press Release	-9.13%	-4.02	***	57	1	11	31	73.7%	49	8	9	14	14	14	46.9%								
35	12/22/2020	Press Release	1.09%	0.48		53	5	10	2	22.6%	51	5	2	1	1	1	5.9%								
36	3/2/2021	Q4 2020 Earnings & Press Release	-22.64%	-9.96	***	62	1	7	43	80.6%	49	0	2	32	32	32	69.4%								
37	3/16/2021	Press Release	-1.78%	-0.75		58	2	3	6	15.5%	53	1	0	0	0	0	0.0%								
38	4/7/2021	Press Releases	-40.88%	-17.04	***	53	3	7	33	75.5%	47	0	0	47	47	47	100.0%								
39	4/12/2021	Press Release	8.85%	3.68	***	60	7	7	21	46.7%	69	3	1	6	6	6	10.1%								
40	4/15/2021	Press Release	-1.39%	-0.56		56	7	5	4	16.1%	68	0	0	0	0	0	0.0%								
41	5/11/2021	Q1 2021 Earnings	2.61%	1.05		54	5	5	2	13.0%	66	2	1	1	1	1	3.0%								
42	6/16/2021	Press Release	2.24%	0.91		50	0	0	0	0.0%	51	4	1	2	2	2	5.9%								
43	6/17/2021	Press Release	0.29%	0.12		52	0	0	0	0.0%	51	0	1	2	2	2	5.9%								
44	6/25/2021	Press Release	-6.37%	-2.54	**	52	12	4	0	7.7%	45	4	5	5	5	5	22.2%								

Sources: S&amp;P Capital IQ, iVolatility, and Factiva.

Notes:

(1) \*\*\*\* Denotes statistical significance at the 99% confidence level or greater. \*\*\* Denotes statistical significance at the 95% confidence level or greater. \*\* Denotes statistical significance at the 90% confidence level or greater.

(2) To obtain the predicted return for each option series on day t, I determine how much of a price change is expected by using the Black-Scholes Formula on both day t-1 and day t. On day t-1, I compute a theoretical price (Pt-1) using the observed underlying stock price on day t-1, the strike price, the time to maturity as of t-1, the risk-free rate of interest on day t-1, and the implied volatility on day t-1. I then calculate a theoretical price for day t (Pt) where the underlying stock price is equal to the stock price on day t multiplied by (1+r<sub>expected</sub>) where r<sub>expected</sub> is the expected return from my market model regression for FibroGen Stock described above, the time to maturity as of day t, the risk-free rate of interest on day t, the strike price (which did not change) and the implied volatility from day t-1. I use the implied volatility from day t-1 instead of day t because the news itself may be a contributor to changes in implied volatility of the underlying security. Then I calculate an expected return for the option series as (Pt/Pt-1) - 1.

(3) To test for statistical significance I compute a t-statistic by dividing the abnormal return by the standard deviation of abnormal returns for that particular series over the prior 20 trading days (or for the first 20 days for an option series issued during the Class Period, the standard deviation of abnormal returns for the first 20 days).

Abnormal returns for days that are excluded from the common stock market model regression are also excluded from the calculation of the standard deviation for each option series.

(4) I have excluded observations in the option pricing data where the bid price was listed as \$0 as they do not reflect the presence of an actionable bid price.

**Exhibit 16**  
**Comparison of Statistical Significance and Abnormal Returns**  
**for FibroGen Call Options for FibroGen Earnings Announcements and Press**  
**Releases vs. Days with No News during the Class Period**

Statistic	Earnings Announcements & Press Releases	Common Stock Statistically Significant	
		Earnings Announcements & Press Releases	Days with No News, Analyst Reports, or SEC Filings
N <sup>(1)</sup>	2,351	670	11,487
Significant Days at 95% Confidence Level	499	376	818
% Significant Days at 95% Confidence Level <sup>(2)</sup>	21.23%	56.12%	7.12%
Average Absolute Abnormal Return <sup>(3)</sup>	22.92%	40.95%	15.48%
Average Volume (Shares) <sup>(4)</sup>	2,678	6,296	698

## Notes:

(1) Each observation represents a date for a specific call option series where a return can be calculated.

(2) 21.23% rate of statistical significance is statistically significantly different than 7.12% at the 99% confidence level using a Chi-Square test. 56.12% rate of statistical significance is also statistically significantly different than 7.12% at the 99% confidence level using a Chi-Square test.

(3) 22.92% absolute abnormal return is statistically significantly different than 15.48% based on a t-test for difference of means at the 99% confidence level. 40.95% absolute abnormal return is also statistically significantly different than 15.48% based on a t-test for difference of means at the 99% confidence level.

(4) The difference between 2,678 and 698 is statistically significant at the 99% confidence level. The difference between 6,296 and 698 is also statistically significant at the 99% confidence level.

**Exhibit 17**  
**Comparison of Statistical Significance and Abnormal Returns**  
**for FibroGen Put Options for FibroGen Earnings Announcements and Press**  
**Releases vs. Days with No News during the Class Period**

Statistic	Earnings Announcements & Press Releases	Common Stock Statistically Significant Earnings Announcements & Press Releases	Days with No News, Analyst Reports, or SEC Filings
N <sup>(1)</sup>	2,276	660	10,496
Significant Days at 95% Confidence Level	416	309	752
% Significant Days at 95% Confidence Level <sup>(2)</sup>	18.28%	46.82%	7.16%
Average Absolute Abnormal Return <sup>(3)</sup>	23.14%	46.65%	14.02%
Average Volume (Shares) <sup>(4)</sup>	2,274	3,970	642

Notes:

(1) Each observation represents a date for a specific put option series where a return can be calculated.

(2) 18.28% rate of statistical significance is statistically significantly different than 7.16% at the 99% confidence level using a Chi-Square test. 46.82% rate of statistical significance is also statistically significantly different than 7.16% at the 99% confidence level using a Chi-Square test.

(3) 23.14% absolute abnormal return is statistically significantly different than 14.02% based on a t-test for difference of means at the 99% confidence level. 46.65% absolute abnormal return is also statistically significantly different than 14.02% based on a t-test for difference of means at the 99% confidence level.

(4) The difference between 2,274 and 642 is statistically significant at the 99% confidence level. The difference between 3,970 and 642 is also statistically significant at the 99% confidence level.

## Appendix A

### Documents Considered

#### **Court Documents**

Corrected Consolidated Class Action Complaint for Violation of the Federal Securities Laws filed November 19, 2021, In Re FibroGen, Inc., Securities Litigation, No. 3:21-cv-02623-EMC.

#### **Court Decisions and Securities Law**

- *Basic, Inc. v. Levinson*, 485 U.S. 224 (1988).
- *Bromberg & Lowenfels*, 4 *Securities Fraud and Commodities Fraud*, § 8.6. (Aug. 1988).
- *Cammer, et al., v. Bruce M. Bloom, et al.*, 711 F. Supp. 1276-94 (D.N.J. 1989).
- *Halliburton Co., et al., v. Erica P. John Fund, Inc.*, 134 S. Ct. 2398 (2014).
- *Krogman v. Sterritt*, 202 F.R.D. 478 (N.D. Tex. 2001).
- Private Securities Litigation Reform Act of 1995, dated December 22, 1995.

#### **SEC Filings**

- FibroGen SEC Form 10-K filings submitted throughout the Class Period.
- FibroGen SEC Form 10-Q filings submitted throughout the Class Period.
- FibroGen SEC Form 8-K filings submitted during the Class Period.
- FibroGen SEC Forms S-3ASR filed on March 1, 2017, March 2, 2020, and August 8, 2022.
- FibroGen Def 14-A Proxy Statements for the fiscal years in the Class Period.

#### **Security Data**

- Historical data for FibroGen Common Stock, the NASDAQ Biotechnology Total Return Index, and the S&P 500 Total Return Index were obtained from S&P Capital IQ.
- Trade and quote data for FibroGen Common Stock during the Class Period and one hundred randomly selected companies trading on the New York Stock Exchange and NASDAQ for April 2020 were obtained from Tick Data, *see* <https://tickapi.tickdata.com/>. Companies trading on the New York Stock Exchange and NASDAQ for April 2020 were identified using Thomson Reuters Eikon.
- Institutional and insider holdings data was obtained from S&P Capital IQ.
- FibroGen Common Stock options data was obtained from iVolatility.
- FibroGen Common Stock market makers data was obtained from Bloomberg, using the RANK function.
- FibroGen Common Stock market capitalization percentiles were obtained from Bloomberg.

- Turnover velocity data for NYSE and NASDAQ were obtained from the World Federation of Exchanges, *see* <https://www.world-exchanges.org/home/index.php/statistics/monthly-reports>.
- The risk-free interest rate was obtained from FRED.
- Nasdaq Biotechnology Index Constituents obtained from Bloomberg.
- Nasdaq Biotechnology Index Market Cap obtained from Bloomberg.
- FibroGen membership in the Nasdaq Biotechnology Total Return Index information obtained from Thomson Reuters Eikon.

### **FibroGen News**

- FibroGen news headlines and select articles downloaded from Factiva for the Class Period. The Factiva search for news over the Class Period resulted in 1,479 unique articles as a result of two searches: 1) one search for “All Sources” with the company tag “FibroGen Inc” and 2) a separate search for “Major News and Business Sources” with keyword fields “Roxadustat” or “Pamrevlumab” or “FibroGen” but excluding news with the company tag “FibroGen Inc”. Both searches were conducted for the period “December 20, 2018 – July 15, 2021”. Articles entitled “NASDAQ New 52-week Highs and Lows” were removed from both searches. Duplicate articles have been removed by a proprietary function accessible in Factiva’s search builder. I acknowledge that this may not reflect all news as the Factiva database is limited to certain sources and content type.
- FibroGen earnings and other press releases during the Class Period, including but not limited to:
  - “FibroGen Announces Positive Phase 3 Pooled Roxadustat Safety and Efficacy Results for Treatment of Anemia in Chronic Kidney Disease,” *GlobeNewswire*, November 8, 2019.
  - “FibroGen Presents Phase 3 Efficacy and Safety Results for Roxadustat Versus Epoetin Alfa as Treatment of Anemia in Incident Dialysis Patients with Chronic Kidney Disease,” *GlobeNewswire*, November 7, 2019 (4:39 PM).
  - “FibroGen Announces Positive Topline Results from Three Global Phase 3 Trials of Roxadustat for Treatment of Anemia in Patients with Chronic Kidney Disease,” *GlobeNewswire*, December 20, 2018.

### **FibroGen Analyst Reports**

- FibroGen, Astellas, and AstraZeneca analyst reports supplied by Counsel for the period of December 20, 2018 – July 15, 2021, including but not limited to:
  - “Front Row ASN - Data Supports Clean Safety, Our Discussions w/ The Lead Doc,” *Jefferies*, November 8, 2019.
- Seeking Alpha articles or reports for FibroGen published during the Class Period under the site’s “Analysis” section.

## Academic Articles

- “Addendum to Cboe VIX White Paper / Cboe Volatility Index,” *Cboe Exchange, Inc.*, August 2, 2021.
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- “Cboe VIX White Paper: Cboe Volatility Index,” *Cboe Exchange, Inc.*, 2021.
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- Robert G. May, "The Influence of Quarterly Earnings Announcements on Investor Decisions as Reflected in Common Stock Price Changes," *Empirical Research in Accounting: Selected Studies, 1971, supplement to the Journal of Accounting Research*, Vol. 9, 119-163 (1971).
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## **Other**

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- [https://indexes.nasdaqomx.com/docs/methodology\\_NBI.pdf](https://indexes.nasdaqomx.com/docs/methodology_NBI.pdf).
- <https://www.ivolatility.com>.
- [https://www.cboe.com/us/options/symboldir/equity\\_index\\_options/?sid=F](https://www.cboe.com/us/options/symboldir/equity_index_options/?sid=F)
- <http://wallstreet.cch.com/LCM/Sections/>.
- <https://www.nyse.com/market-model>.
- <https://www.nasdaqtrader.com/Trader.aspx?id=TradingUSEquities>.
- <https://www.nasdaq.com/market-activity/stocks/fgen/dividend-history>.
- <http://www.nasdaq.com/options/>.
- <http://www.rss-specifications.com/>.
- <http://www.rss-specifications.com/what-is-rss.htm>.
- SEC Form S-3 eligibility information from [www.sec.gov/about/forms/forms-3.pdf](http://www.sec.gov/about/forms/forms-3.pdf).
- [https://www.sec.gov/cgi-bin/browse-edgar?action=getcompany&CIK=0000921299&type=s-3&dateb=&owner=exclude&count=40&search\\_text=](https://www.sec.gov/cgi-bin/browse-edgar?action=getcompany&CIK=0000921299&type=s-3&dateb=&owner=exclude&count=40&search_text=)

# Appendix B

## CHAD W. COFFMAN, MPP, CFA

Global Economics Group, LLC  
140 South Dearborn Street, Suite 1000  
Chicago, IL 60603  
Office: (312) 470-6500  
Mobile: (815) 382-0092  
Email: ccoffman@globaleconomicsgroup.com

### EMPLOYMENT:

#### **Global Economics Group, LLC** President (2008 - Current)

Global Economics Group specializes in the application of economics, finance, statistics, and valuation principles to questions that arise in a variety of contexts, including litigation and policy matters throughout the world. With offices in Chicago, Boston, and New York, Principals of Global Economics Group have extensive experience in high-profile securities, antitrust, labor, and intellectual property matters.

#### **Market Platform Dynamics, LLC** Chief Financial Officer & Chief Operating Officer (2010 – Current)

Market Platform Dynamics is a management consulting firm that specializes in assisting platform-based companies profit from industry disruption caused by the introduction of new technologies, new business models and/or new competitive threats. MPD's experts include economists, econometricians, product development specialists, strategic marketers and recognized thought leaders who apply cutting-edge research to the practical problems of building and running a profitable business.

#### **Chicago Partners, LLC** Principal (2007 – 2008) Vice President (2003 – 2007) Director (2000 – 2003) Senior Associate (1999 – 2000) Associate (1997 – 1999) Research Analyst (1995 – 1997)

### EDUCATION:

**CFA** Chartered Financial Analyst, 2003

**M.P.P.** University of Chicago, 1997  
Masters of Public Policy, with a focus in economics including coursework in Finance, Labor Economics, Econometrics, and Regulation

**B.A.**   Knox College, 1995  
Economics, Magna Cum Laude  
Graduated with College Honors for Paper entitled “Increasing Efficiency in Water Supply Pricing: Using Galesburg, Illinois as a Case Study”  
Dean’s List Every Term  
Phi Beta Kappa

## **PROFESSIONAL EXPERIENCE:**

### Securities, Valuation, and Market Manipulation Cases:

- Testifying Expert in numerous high-profile class action securities matters including, but not limited to:
  - In Re: Bank of America Corp. Securities, Derivative, and Employee Retirement Income Security Act (ERISA) Litigation. Parties settled for \$2.4 billion in which I served as Plaintiffs’ damages and loss causation expert.
  - In Re: Schering-Plough Corporation/ Enhance Securities Litigation. Parties settled for \$473 million in which I served as Plaintiffs’ damages and loss causation expert.
  - In Re: REFCO Inc. Securities Litigation. Parties settled for \$367 million in which I served as Plaintiffs’ damages and loss causation expert.
  - In Re: Computer Sciences Corporation Securities Litigation. Parties settled for \$98 million in which I served as Plaintiffs’ damages and loss causation expert.
  - Full list of testimonial experience is provided below
- Engaged several dozen times as a neutral expert by prominent mediators to evaluate economic analyses of other experts.
- Expert consultant for the American Stock Exchange (AMEX) where I evaluated issues related to multiple listing of options. Performed econometric analysis of various measures of option spread using tens of millions of trades.
- Performed detailed audit of CDO valuation models employed by a banking institution to satisfy regulators – non-litigation matter.
- Played significant role in highly-publicized internal accounting investigations of two Fortune 500 companies. One led to restatement of previously issued financial statements and both involved SEC investigations.

### **Testimony:**

- Testifying expert in the matter of Kuo, Steven Wu v. Xceedium Inc, Supreme Court of New York, County of New York, Index No. 06-100836. Filed report re: the fair value of Mr. Kuo’s shares. Case settled at trial.

- Testifying expert in the matter of Pallas, Dennis H. v. BPRS/Chestnut Venture Limited Partnership and Gerald Nudo, Circuit Court of Cook County, Illinois, County Department, Chancery Division. Filed report re: fair value of Pallas shares. Report: July 9, 2008. Deposition August 6, 2008. Court Testimony February 11, 2009.
- Testifying expert in Washington Mutual Securities Litigation, United States District Court for the Western District of Washington at Seattle, No. 2:08-md-1919 MJP, Lead Case No. C08-387 MJP. Filed declaration August 5, 2008 re: Plaintiffs' loss causation theory. Filed expert report April 30, 2010. Filed expert rebuttal report August 4, 2010. Filed declaration re: Plan of Allocation September 25, 2011.
- Testifying expert in DVI Securities Litigation, Case No. 2:03-CV-05336-LDD, United States District Court for the Eastern District of Pennsylvania. Filed expert report October 1, 2008 re: damages. Filed expert rebuttal report December 17, 2008. Deposition January 27, 2009. Filed expert rebuttal report June 24, 2013.
- Testifying expert in Syratech Corporation v. Lifetime Brands, Inc. and Syratech Acquisition Corporation, Supreme Court of the State of New York, Index No. 603568/2007. Filed expert report October 31, 2008.
- Expert declaration in Jacksonville Police and Fire Pension Fund, et al. v. AIG, Inc., et al., No. 08-CV-4772-LTS; James Connolly, et al. v. AIG, Inc., et al., No. 08-CV-5072-LTS; Maine Public Employees Retirement System, et al. v. AIG, Inc., et al., No. 08-CV-5464-LTS; and Ontario Teachers' Pension Plan Board, et al. v. AIG, Inc., et al., No. 08-CV-5560-LTS, United States District Court for the Southern District of New York. Filed declaration February 18, 2009.
- Expert declaration in Connetics Securities Litigation, Case No. C 07-02940 SI, United States District Court for the Northern District of California, San Francisco Division. Filed expert report March 16, 2009. Filed declaration re: Plan of Allocation September 9, 2009.
- Testifying expert in Boston Scientific Securities Litigation, Master File No. 1:05-cv-11934 (DPW), United States District Court District of Massachusetts. Filed expert report August 6, 2009. Deposition October 6, 2009.
- Expert declaration in Louisiana Sheriffs' Pension and Relief Fund, et al. v. Merrill Lynch & Co, Inc., et al., Case Number 08-cv-09063, United States District Court for the Southern District of New York. Filed declaration re: Plan of Allocation October, 2009.
- Testifying expert in Henry J. Wojtunik v. Joseph P. Kealy, John F. Kealy, Jerry A. Kleven, Richard J. Seminoff, John P. Stephen, C. James Jensen, John P. Morbeck, Terry W. Beiriger, and Anthony T. Baumann. Filed expert report January 25, 2010.
- Testifying expert in REFCO Inc. Securities Litigation, Case No. 05 Civ. 8626 (GEL), United States District Court for the Southern District of New York. Filed expert report February 2, 2010. Filed expert rebuttal report March 12, 2010. Deposition March 26, 2010.

- Expert declaration in New Century Securities Litigation, Case No. 07-cv-00931-DDP, United States District Court Central District of California. Filed declaration March 11, 2010.
- Testifying expert in Louisiana Municipal Police Employees' Retirement System, et al. v. Tilman J. Fertitta, Steven L. Scheinthal, Kenneth Brimmer, Michael S. Chadwick, Michael Richmond, Joe Max Taylor, Fertitta Holdings, Inc., Fertitta Acquisition Co., Richard Liem, Fertitta Group, Inc. and Fertitta Merger Co, C.A. No. 4339-VCL, Court of Chancery of the State of Delaware. Filed expert report April 23, 2010.
- Testifying expert in Edward E. Graham and William C. Nordlund, individually and d/b/a Silver King Capital Management v. Eton Park Capital Management, L.P., Eton Park Associates, L.P. and Eton Park Fund, L.P. Case No. 1:07-CV-8375-GBD, Circuit Court of Shelby County, Alabama. Filed expert rebuttal report July 8, 2010. Deposition September 1, 2010. Filed supplemental expert rebuttal report August 22, 2011.
- Testifying expert in Moody's Corporation Securities Litigation. Case No. 1:07-CV-8375-GBD, United States District Court for the Southern District of New York. Filed expert rebuttal report August 23, 2010. Deposition October 7, 2010. Filed rebuttal reply report November 5, 2010. Filed expert report May 25, 2012.
- Testifying expert in Minneapolis Firefighters' Relief Association v. Medtronic, Inc., et al. Civil No. 08-6324 (PAM/AJB), United States District Court, District of Minnesota. Filed expert report January 14, 2011.
- Testifying expert in Schering-Plough Corporation/ENHANCE Securities Litigation Case No. 2:08-cv-00397 (DMC) (JAD), United States District Court, District of New Jersey. Filed declaration February 7, 2011. Filed expert report September 15, 2011. Filed expert rebuttal report October 28, 2011. Filed declaration January 30, 2012. Deposition November 15, 2011 and November 29, 2011.
- Testifying expert in Fannie Mae 2008 Securities Litigation, Master File No. 08 Civ. 7831 (PAC), United States District Court for the Southern District of New York. Filed expert report July 18, 2011.
- Expert declaration in Grady Scott Weston et. al v. RCS Capital Corporation, et. al, Civil Action No. 1:14-CV-10136-GBD, United States District Court for the Southern District of New York. Filed declaration re: aggregate damages August 11, 2017.
- Testifying expert in Bank of America Corp. Securities, Derivative, and Employee Retirement Income Security Act (ERISA) Litigation, Master File No. 09 MDL 2058 (PKC), United States District Court for the Southern District of New York. Filed expert report August 29, 2011. Filed expert rebuttal report September 26, 2011. Filed expert report March 16, 2012. Filed expert rebuttal report April 9, 2012. Filed expert rebuttal report April 29, 2012. Deposition October 14, 2011 and May 24, 2012.
- Testifying expert in Toyota Motor Corporation Securities Litigation, Case No. 10-922 DSF (AJWx), United States District Court, Central District of California. Filed expert report February

17, 2012. Deposition March 28, 2012. Filed expert rebuttal report August 2, 2012. Filed declaration re: Plan of Allocation January 28, 2013.

- Testifying expert in The West Virginia Investment Management Board and the West Virginia Consolidated Public Retirement Board v. The Variable Annuity Life Insurance Company, Civil No. 09-C-2104, Circuit Court of Kanawha County, West Virginia. Filed expert report June 1, 2012. Depositions June 19, 2013 and December 11, 2015.
- Testifying expert in Aracruz Celulose S.A. Securities Litigation, Case No. 08-23317-CIV-LENARD, United States District Court for the Southern District of Florida. Filed expert report July 20, 2012. Deposition September 14, 2012. Filed expert rebuttal report October 29, 2012. Filed declaration re: Plan of Allocation May 20, 2013.
- Testifying expert in In Re Computer Sciences Corporation Securities Litigation, CIV. A. No. 1:11-cv-610-TSE-IDD, United States District Court for the Eastern District of Virginia, Alexandria Division. Filed expert report November 9, 2012. Filed supplemental report February 18, 2013. Filed expert rebuttal report March 25, 2013. Deposition March 27, 2013. Filed declaration re: Plan of Allocation August 7, 2013.
- Testifying expert in In Re Weatherford International Securities Litigation, Case 1:11-cv-01646-LAK, United States District Court for the Southern District of New York. Filed declaration July 1, 2011. Filed expert report April 1, 2013. Deposition April 26, 2013.
- Testifying expert in In Re: Regions Morgan Keegan Closed-End Fund Litigation, Case 2:07-cv-02830-SHM-dkv, United States District Court for the Western District of Tennessee, Western Division. Court testimony April 12, 2013.
- Testifying expert in City of Roseville Employees' Retirement System and Southeastern Pennsylvania Transportation Authority, derivatively on behalf of Oracle Corporation, Plaintiff, v. Lawrence J. Ellison, Jeffrey S. Berg, H. Raymond Bingham, Michael J. Boskin, Safra A. Catz, Bruce R. Chizen, George H. Conrades, Hector Garcia-Molina, Donald L. Lucas, and Naomi O. Seligman, Defendants, and Oracle Corporation, Nominal Defendant, C.A. No. 6900-CS, Court of Chancery of the State of Delaware. Filed expert report May 13, 2013. Filed expert rebuttal report June 21, 2013. Deposition July 17, 2013.
- Testifying expert in In Re BP plc Securities Litigation, No. 4:10-md-02185, Honorable Keith P. Ellison, United States District Court for the Southern District of Texas, Houston Division. Filed expert report June 14, 2013. Deposition July 25, 2013. Filed expert rebuttal report October 7, 2013. Filed declaration re: Plaintiff accounting losses November 17, 2013. Filed expert report January 6, 2014. Deposition January 22, 2014. Filed expert rebuttal report March 12, 2014. Filed expert report March 17, 2014. Hearing testimony April 21, 2014. Deposition June 3, 2014. Filed declaration re: damages June 3, 2014.
- Testifying expert in In Re Celestica Inc. Securities Litigation, Civil Action No. 07-CV-00312-GBD, United States District Court for the Southern District of New York. Filed expert report June 14, 2013. Filed expert rebuttal report September 10, 2013. Deposition September 24, 2013.

- Testifying expert in In Re Dendreon Corporation Class Action Litigation, Master Docket No. C11-01291JLR, United States District Court for the Western District of Washington at Seattle. Filed declaration re: Plan of Allocation June 14, 2013.
- Testifying expert in In Re Hill v. State Street Corporation, Master Docket No. 09-cv12146-GAO, United States District Court for the District of Massachusetts. Filed expert report October 28, 2013.
- Testifying expert in In Re BNP Paribas Mortgage Corporation and BNP Paribas v. Bank of America, N.A., Master Docket No. 09-cv-9783-RWS, United States District Court for the Southern District of New York. Filed expert report November 25, 2013. Filed expert rebuttal report March 17, 2014. Deposition June 26-27, 2014.
- Testifying expert in Stan Better and YRC Investors Group v. YRC Worldwide Inc., William D. Zollars, Michael Smid, Timothy A. Wicks and Stephen L. Bruffet, Civil Action No. 11-2072-KHV, United States District Court for the District of Kansas. Filed declaration re: Plan of Allocation February 5, 2014. Filed expert report May 29, 2015. Filed expert report February 5, 2016. Filed expert rebuttal report March 27, 2016.
- Testifying expert in The Archdiocese of Milwaukee Supporting Fund v. Halliburton Company, et al., Civil Action No. 3:02-CV-1152-M, United States District Court for the Northern District of Texas, Dallas Division. Filed expert rebuttal report October 30, 2014. Deposition November 11, 2014. Hearing testimony December 1, 2014. Filed expert report March 11, 2016. Filed expert rebuttal report May 13, 2016. Deposition June 10, 2016. Hearing testimony re: Plan of Allocation July 31, 2017.
- Testifying expert in In Re HP Securities Litigation, Master File No. 3:12-cv-05980-CRB, United States District Court for the Northern District of California, San Francisco Division. Filed expert report November 4, 2014. Deposition December 3, 2014. Filed expert rebuttal report January 26, 2015.
- Testifying expert in In Re MGM Mirage Securities, No. 2:09-cv-01558-GMN-VCF, United States District Court for the District of Nevada. Filed expert report November 12, 2014. Deposition January 6, 2015. Filed expert rebuttal report April 2, 2015.
- Testifying expert in Adam S. Levy v. Thomas Gutierrez, Richard J. Gaynor, Raja Bal, J. Michal Conaway, Kathleen A. Cote, Ernest L. Godshalk, Matthew E. Massengill, Mary Petrovich, Robert E. Switz, Noel G. Watson, Thomas Wroe, Jr., Morgan Stanley & Co. LLC, Goldman, Sachs & Co., and Canaccord Genuity Inc. and Apple Inc., No. 1:14-cv-00443-JL, United States District Court for the District of New Hampshire. Filed declaration January 7, 2015. Filed expert report September 20, 2018. Deposition December 7, 2018. Filed expert rebuttal report February 22, 2019. Filed expert report June 7, 2019. Deposition September 6, 2019.
- Testifying expert in In Re Nu Skin Enterprises, Inc., Securities Litigation, Master File No. 2:14-cv-00033-DB, United States District Court for the District of Utah, Central Division. Filed expert

report June 26, 2015. Deposition August 17, 2015.

- Testifying expert in In Re Intuitive Surgical Securities Litigation, Master File No. 5:13-cv-01920-EJD, United States District Court for the Northern District of California. Filed expert report September 1, 2015. Filed expert rebuttal report November 16, 2015. Filed expert report November 8, 2016. Filed expert report February 8, 2017. Deposition December 12, 2017.
- Testifying expert in Babak Hatamian, et al., v. Advanced Micro Devices, Inc., et al., No. 4:14-cv-00226-YGR, United States District Court for the Northern District of California, San Francisco Division. Filed expert report September 4, 2015. Filed expert rebuttal report December 7, 2015. Filed expert report November 18, 2016. Filed expert rebuttal report January 17, 2017. Filed declaration March 6, 2017. Deposition March 7, 2017.
- Testifying expert in In Re NII Holdings, Inc. Securities Litigation, No. 1:14-cv-00227-LMB-JFA, United States District Court for the Eastern District of Virginia, Alexandria Division. Filed expert report September 11, 2015. Deposition September 17, 2015. Filed expert rebuttal report October 28, 2015. Filed expert report January 8, 2016.
- Testifying expert in In Re Barrick Gold Securities Litigation, No. 1:13-cv-03851-SAS, United States District Court for the Southern District of New York. Filed expert report September 15, 2015.
- Expert declaration in In Re Tower Group International, Ltd. Securities Litigation, Master Docket No. 1:13-cv-5852-AT, United States District Court for the Southern District of New York. Filed declaration re: Plan of Allocation October 6, 2015.
- Testifying expert in Beaver County Employees' Retirement Fund et al. v. Tile Shop Holdings Inc. et al., No. 0:14-cv-00786-ADM-TNL, United States District Court for the District of Minnesota. Filed expert report December 1, 2015. Deposition March 15, 2016. Filed expert report July 1, 2016. Deposition July 26, 2016. Filed expert reply report August 15, 2016.
- Testifying expert in In Re Barclays Bank PLC Securities Litigation, Civil Action No. 1:09-cv-01989-PAC, United States District Court for the Southern District of New York. Filed expert report December 15, 2015. Filed expert rebuttal report February 2, 2016. Filed rebuttal reply expert report March 18, 2016. Deposition April 21, 2016.
- Testifying expert in In Re Petrobras Securities Litigation, Civil Action No. 15-cv-03733-JSR, 15-cv-07615-JSR, 15-cv-6618-JSR, 15-cv-02192-JSR, United States District Court for the Southern District of New York. Filed expert report May 6, 2016. Filed expert report May 27, 2016. Filed expert reply report June 17, 2016. Deposition June 24, 2016.
- Testifying expert in In Re Genworth Financial, Inc. Securities Litigation, Civ. A. No. 3:14-cv-00682-JAG, United States District Court for the Eastern District of Virginia, Richmond Division. Filed declaration re: Plan of Allocation June 2, 2016.

- Testifying expert in Zubair Patel, Individually and on Behalf of All Others Similarly Situated, Plaintiff, vs. L-3 Communications Holdings, Inc., et al., Defendants, No. 1:14-cv-06038-VEC, United States District Court for the Southern District of New York. Filed expert report June 30, 2016. Deposition July 20, 2016. Filed expert rebuttal report August 26, 2016.
- Testifying expert in Leonard Howard, Individually and on Behalf of All Others Similarly Situated, Plaintiff, vs. Liquidity Services, Inc., et al., Defendants, No. 1:14-cv-01183-BAH, United States District Court for the District of Columbia. Filed expert report September 2, 2016.
- Testifying expert in James Quinn, Derivatively on Behalf of Nominal Defendant Apple REIT Ten, Inc., Plaintiff, v. Glade M. Knight, Justin Knight, Kent W. Colton, R. Garnett Hall, Jr., David J. Adams, Anthony F. Keating III, David Buckley, Kristian Gathright, David McKenney, Bryan Peery, and Apple Hospitality REIT, Inc., Defendants, and Apple REIT Ten, Inc., Nominal Defendant, No. 3:16-cv-610, United States District Court for the Eastern District of Virginia, Richmond Division. Filed expert report October 14, 2016. Deposition October 20, 2016.
- Testifying expert in Dr. Joseph F. Kasper, et al., Plaintiff, v. AAC Holdings, Inc., et al., Defendants, No. 3:15-cv-00923, United States District Court for the Middle District of Tennessee, Nashville Division. Filed expert report October 18, 2016. Deposition November 29, 2016. Filed expert rebuttal report February 10, 2017. Filed expert report December 4, 2017.
- Testifying expert in KBC Asset Management NV, et al., Plaintiff, v. 3D Systems Corporation, Abraham N. Reichental, Damon J. Gregoire, and Ted Hull, Defendants, No. 15-cv-02393-MGL, United States District Court for the District of South Carolina, Rock Hill Division. Filed expert report October 31, 2016. Deposition January 5, 2017. Filed expert report April 21, 2017.
- Testifying expert in Arkansas Teacher Retirement System, et al., Plaintiff, v. Virtus Investment Partners, Inc., Defendants, No. 15-cv-1249-WHP, United States District Court for the Southern District of New York. Filed expert report November 7, 2016. Filed expert rebuttal report February 17, 2017. Deposition February 28, 2017. Filed expert report June 16, 2017. Filed expert rebuttal report July 26, 2017. Deposition August 9, 2017. Filed declaration re: prior reports December 4, 2017.
- Testifying expert in Laborers Pension Trust Fund – Detroit, Individually and on Behalf of All Others Similarly Situated, Plaintiffs, vs. Conn's, Inc., et al., Defendants, No. 4:14-cv-00548 (KPE), United States District Court for the Southern District of Texas, Houston Division. Filed expert report November 10, 2016. Deposition December 9, 2016. Filed expert rebuttal report March 27, 2017.
- Testifying expert in Glen Hartsock, individually and on behalf of all others similarly situated Plaintiff, v. Spectrum Pharmaceuticals, Inc., and Rajesh C. Shrotriya, Defendants, No. 16-cv-02279-RFB-GWF and Olutayo Ayeni, individually and on behalf of all others similarly situated Plaintiff, v. Spectrum Pharmaceuticals, Inc., Rajesh C. Shrotriya, Kurt A. Gustafson, Joseph Turgeon, and Lee Allen, Defendants, No. 16-cv-02649-KJD-VCF, United States District Court for the District of Nevada. Filed declaration re: damages December 8, 2016.

- Testifying expert in In Re: ARIAD Pharmaceuticals, Inc. Securities Litigation, No. 1:13-cv-12544 (WGY), United States District Court District of Massachusetts. Filed expert report March 6, 2017.
- Testifying expert in Washtenaw County Employees' Retirement System, individually and on behalf of all others similarly situated, Plaintiff, v. Walgreen Co., Gregory D. Wasson, and Wade Miquelon, Defendants, No. 15-cv-3187, United States District Court for the Northern District of Illinois. Filed expert report April 21, 2017. Deposition June 15, 2017. Filed expert rebuttal report September 15, 2017. Filed expert report November 11, 2020. Filed expert rebuttal report December 14, 2020. Deposition January 29, 2021.
- Testifying expert in Lou Baker, individually and on behalf of all others similarly situated, Plaintiff, v. SeaWorld Entertainment, Inc., James Atchison, James M. Heaney, Marc Swanson, and The Blackstone Group L.P., Defendants, No. 3:14-cv-02129-MMA-KSC, United States District Court for the Southern District of California. Filed expert report May 19, 2017. Deposition July 20, 2017. Filed expert rebuttal report September 14, 2017. Filed expert report January 22, 2019. Filed expert rebuttal report March 1, 2019. Deposition March 26, 2019.
- Testifying expert in Benjamin Gross, individually and on behalf of all others similarly situated, Plaintiff, v. GFI Group, Inc., Colin Heffron, and Michael Gooch, Defendants, No. 3:14-cv-09438-WHP, United States District Court for the Southern District of New York. Filed expert report May 30, 2017. Filed expert report August 7, 2017. Filed expert rebuttal report August 28, 2017. Deposition September 27, 2017.
- Testifying expert in Murray Rubinstein, Jeffrey F. St. Clair, William McWade, Harjot Dev and Vikas Shah, individually and on behalf of all others similarly situated, Plaintiffs, v. Richard Gonzalez and Abbvie Inc., Defendants, No. 14-cv-9465, United States District Court for the Northern District of Illinois, Eastern Division. Filed expert report December 21, 2017. Deposition February 22, 2018. Filed supplemental expert report March 9, 2018. Filed expert reply report June 14, 2018. Filed expert sur-sur reply report August 28, 2018.
- Testifying expert in In Re: SanDisk LLC Securities Litigation, No. 3:15-cv-01455-VC, United States District Court for the Northern District of California, San Francisco Division. Filed expert report January 19, 2018. Deposition January 31, 2018. Filed expert report August 30, 2018. Filed expert report October 23, 2018. Deposition November 15, 2018. Filed declaration re: Plan of Allocation and calculation of aggregate damages May 6, 2019.
- Testifying expert in In Re: EZCORP, Inc. Securities Litigation, No. 1:15-cv-00608-SS, United States District Court for the Western District of Texas. Filed expert report January 31, 2018. Deposition March 6, 2018.
- Testifying expert in Kevin Murphy, Individually and On Behalf of All Others Similarly Situated, Plaintiff, v. Precision Castparts Corp., Mark Donegan, and Shawn R. Hagel, Defendants, No. 3:16-cv-00521-SB, United States District Court for the District of Oregon, Portland Division. Filed expert report March 2, 2018. Filed expert report March 22, 2019. Filed expert reply report June 19, 2019. Deposition July 19, 2019.

- Testifying expert in In Re: Rent-A-Center, Inc. Securities Litigation, No. 4:16-cv-00978-ALM- CMC, United States District Court for the Eastern District of Texas, Sherman Division. Filed expert report March 13, 2018. Filed rebuttal reply report July 12, 2018. Deposition August 21, 2018.
- Testifying expert in Public Employees' Retirement Systems of Mississippi, Individually and On Behalf of All Others Similarly Situated, Plaintiff, v. TreeHouse Foods, Inc., Sam K. Reed, Dennis F. Riordan and Christopher D. Silva, Defendants, No. 1:16-cv-10632, United States District Court for the Northern District of Illinois. Filed expert report July 13, 2018. Deposition September 21, 2018. Filed rebuttal reply report May 17, 2019.
- Testifying expert in Gary Hefler, et al., Plaintiffs, v. Wells Fargo & Company, et al., Defendants, No. 1:16-cv-05479-JST, United States District Court for the Northern District of California. Filed declaration re: Plan of Allocation July 27, 2018.
- Testifying expert in In re Banco Bradesco S.A. Securities Litigation, No. 1:16-cv-04155-GHW, United States District Court for the Southern District of New York. Filed expert report August 17, 2018. Filed supplemental expert report October 11, 2018. Deposition October 12, 2018. Filed expert report December 14, 2018. Filed expert report March 8, 2019. Filed declaration re: Plan of Allocation July 19, 2019.
- Testifying expert in Richard Di Donato, et al., Plaintiffs, v. Insys Therapeutics Incorporated, et al. Defendants, No. CV-16-00302-PHX-NVW, United States District Court for the District of Arizona. Filed expert report August 31, 2018. Deposition October 4, 2018. Filed expert report November 30, 2018. Filed expert report July 26, 2019. Filed expert report November 1, 2019.
- Consulting expert in In Re: Wilmington Trust Securities Litigation, Master File No. 10-cv-00990-ER, United States District Court for the District of Delaware. Filed declaration re: Plan of Allocation and calculation of aggregate damages September 17, 2018.
- Testifying expert in Atul Singh Deora, Individually and On Behalf of All Others Similarly Situated, Plaintiffs, v. Nanhealth, Inc., Patrick Soon-Shiong, Paul A. Holt, Michael S. Sitrick, Kirck K. Calhoun, Mark Bennett, Edward Miller, Michael Blaszyk, Jefferies Llc, First Analysis Securities Corporation, Canaccord Genuity Inc., And Fbr Capital Markets & CO., Defendants., No. 2:17-CV-01825-BRO-MRW, United States District Court for the Central District of California Western Division. Filed expert report September 20, 2018.
- Testifying expert in City of Sunrise General Employees' Retirement Plan, Plaintiff vs. FleetCor Technologies, Inc., et al., Defendants, No. 1:17-CV-02207-LMM, United States District Court for the Northern District of Georgia Atlanta Division. Filed expert report January 4, 2019. Deposition March 20, 2019. Filed expert report May 6, 2019.
- Testifying expert in Guevoura Fund LTD., On Behalf of Itself and All Others Similarly Situated, Plaintiffs, v. Robert F.X. Sillerman, D. Geoffrey Armstrong, John Miller, Michael John Meyer, and SFX Entertainment, Inc., Defendants, Case No. 1:15-cv-07192-CM, Case No. 1:18-cv-09784-CM,

United States District Court for the Southern District of New York. Filed expert report January 18, 2019.

- Testifying expert in Leon D. Milbeck On Behalf of Himself and All Others Similarly Situated, v. TrueCar, Inc, et al., Defendants, No. 2:18-cv-02612-SVW, United States District Court for the Central District of California. Filed expert report March 8, 2019. Deposition April 8, 2019.
- Testifying expert in Lewis Cosby, Kenneth R. Martin, as Beneficiary of the Kenneth Ray Martin Roth IRA, and Martin Weakly On Behalf of Themselves and All Others Similarly Situated, vs. KPMG, LLP, Case No. 3:16-cv-00121, United States District Court for the Eastern District of Tennessee, Knoxville Division. Filed expert report March 15, 2019. Deposition April 12, 2019. Filed supplemental expert report April 19, 2019. Deposition April 25, 2019. Filed rebuttal reply report June 14, 2019.
- Testifying expert in Shawn Sanawaz, Individually and On Behalf of All Other Similarly Situated, v. Intellipharmaceutics International Inc., Isa Odidi, and Domenic Della Penna, Defendants, No. 1:17-cv-05761-JPO, United States District Court for the Southern District of New York. Filed expert report May 06, 2019.
- Testifying expert in Kevin L. Dougherty, Individually and on Behalf of All Others Similarly Situated, v. Esperion Therapeutics, Inc., et al., Defendants, No. 2:16-cv-10089-AJT-RSW, United States District Court for the Eastern Michigan of Michigan. Filed expert report June 6, 2019. Deposition July 26, 2019. Filed rebuttal reply report October 7, 2019. Filed expert report May 15, 2020. Deposition July 31, 2020.
- Testifying expert in West Virginia Investment Management Board, Stichting Blue Sky Global Equity Active Low Volatility Fund, and Stichting Blue Sky Active Large Cap Equity USA Fund vs. SCANA Corporation., et al., Civ. A. No. 3:17-cv-2616-MBS, United States District Court for the District of South Carolina. Filed expert report June 28, 2019. Deposition August 16, 2019.
- Testifying expert in Eric Weiner, Individually and on Behalf of All Others Similarly Situated, vs. Tivity Health, Inc., Donato Tramuto, Glenn Hargreaves and, Adam Holland, Defendants, Case No.: 3:17-cv-01469 United States District Court for the Middle District of Tennessee. Filed expert report July 1, 2019. Deposition September 4, 2019. Filed rebuttal reply report December 20, 2019. Filed expert report July 30, 2020. Filed rebuttal reply report September 30, 2020. Deposition October 22, 2020.
- Testifying expert in In Re Dr. Reddy's Laboratories Limited Securities Litigation, No. 3:17-cv-06436-PGS-DEA, United States District Court for the District of New Jersey. Filed expert report July 19, 2019. Deposition September 10, 2019.
- Testifying expert in Peace Officers' Annuity and Benefit Fund of Georgia, Individually and On Behalf of All Others Similarly Situated, and Jacksonville Police and Fire Pension Fund, Individually and On Behalf of All Others Similarly Situated vs. DaVita, Inc. et al., No. 1:17-cv-00304-WJM-NRN, United States District Court for the District of Colorado. Filed expert report January 31, 2020. Deposition May 27, 2020.

- Testifying Expert in In Re Avon Securities Litigation, No. 19 Civ. 01420- CM, United States District Court for the Southern District of New York. Filed expert report February 13, 2020.
- Testifying Expert in In Re Allergan Generic Drug Pricing Securities Litigation, Civil Action No. 2:16-9449 (KSH) (CLW), United States District Court for the District of New Jersey. Filed expert report March 20, 2020. Deposition July 16, 2020. Filed expert reply report November 25, 2020.
- Expert declaration in Martin Cohen, Individually and On Behalf of All Others Similarly Situated, v. Luckin Coffee Inc., Jenny Zhiya Qian, and Reinout Hendrik Schakel, Case no. 1:20-cv-01293-LJL, United States District Court for the Southern District of New York. Filed declaration May 13, 2020.
- Testifying Expert in In RE Navient Corporation Securities Litigation, No. 1:17-cv-08373-RBK-AMD, United States District Court of New Jersey. Filed expert report May 15, 2020. Deposition July 23, 2020. Filed declaration August 21, 2020. Filed expert report April 16, 2021. Deposition June 3, 2021.
- Testifying Expert in Yellowdog Partners, LP, Individually and on Behalf of All Others Similarly Situated, vs. CURO Group Holdings Corp., et al., Civil Action No. 2:18-cv-02662-JWL-KGG, United States District Court for the District of Kansas, Kansas City. Filed expert report May 18, 2020.
- Testifying Expert in Julian Keippel, Individually and On Behalf of All Others Similarly Situated, vs. Health Insurance Innovations, Inc., Gavin Southwell, and Michael D. Hershberger, No. 8:19-CV-00421-WFJ-CPT, United States District Court Middle District of Florida Tampa Division. Filed expert report May 21, 2020. Deposition June 15, 2020.
- Testifying Expert in In Re Perrigo Company plc Securities Litigation, No: 1:19-cv-00070-DLC, United States District Court for the Southern District of New York. Filed expert report July 10, 2020. Deposition August 4, 2020. Filed expert report October 6, 2020. Filed expert rebuttal reply report December 4, 2020. Deposition March 4, 2021.
- Testifying Expert in Plymouth County Retirement System, Individually and On Behalf of All Others Similarly Situated, vs. GTT Communications, Inc., Richard D. Calder, Jr., Chris McKee, Michael Sicoli, And Gina Nomellini, Case No. 1:19-cv-00982-CMH-MSN, United States District Court for the Eastern District of Virginia Alexandria Division. Filed expert report August 7, 2020. Filed expert report September 25, 2020.
- Testifying Expert in Thomas W. Luczak, Individually and On Behalf of All Others Similarly Situated, vs. National Beverage Corp., Nick A. Caporella, and George R. Bracken, Case No. 0:18-cv-61631-KMM, United States District Court for the Southern District of Florida. Filed expert report September 25, 2020. Deposition November 5, 2020.

- Expert declaration in In re: PG&E Corporation – and – Pacific Gas and Electric Company Debtors, Case No. 19-30088 (DM), United States Bankruptcy Court for the Northern District of California, San Francisco Division. Filed declaration September 28, 2020.
- Testifying Expert in Oklahoma Police Pension Fund and Retirement System, Individually and on Behalf of All Others Similarly Situated, Plaintiff, v. Teligent, Inc. and Jason Grenfell-Gardner, Defendants, Case No. 1:19-cv-03354-VM, United States District Court for the Southern District of New York. Filed expert report September 30, 2020. Deposition March 11, 2021.
- Testifying Expert in John Utesch, Individually and on Behalf of All Others Similarly Situated, Plaintiff, v. Lannett Company, Inc., Arthur P. Bedrosian, and Martin P. Galvan, Defendants, Civil Action No. 2:16-cv-05932-WB, United States District Court for the Eastern District of Pennsylvania. Filed expert report October 1, 2020. Deposition December 10, 2020. Filed expert rebuttal report on May 13, 2021. Hearing testimony July 27, 2021.
- Testifying Expert in City of Warren Police and Fire Retirement System, Individually and on Behalf of All Others Similarly Situated, Plaintiff, v. World Wrestling Entertainment, Inc., Vincent K. McMahon, George A. Barrios and Michelle D. Wilson, Defendants, Civil Action No. 1:20-cv-02031-JSR, United States District Court for the Southern District of New York. Filed expert report on October 6, 2020. Deposition October 14, 2020.
- Testifying Expert in Employees' Retirement System of the Puerto Rico Electric Power Authority, Individually and on Behalf of All Others Similarly Situated, Plaintiff, vs. Conduent Inc., Ashok Vemuri, and Brian Webb-Walsh, Defendants, Case No. 2:19-cv-08237-SDW, United States District Court for the District of New Jersey. Filed expert report on December 7, 2020. Deposition December 22, 2020.
- Testifying Expert in The Police Retirement System of St. Louis, Individually and On Behalf of All Others Similarly Situated, Plaintiff, v. Granite Construction Incorporated, James H. Roberts, Jigisha Desai, and Laurel J. Krzeminski, Defendants, Case No. 3:19-cv-04744-WHA, United States District Court for the Northern District of California. Filed expert report on November 25, 2020. Filed declaration re: Plan of Allocation May 25, 2021.
- Testifying Expert in Plumbers & Pipefitters National Pension Fund and Juan Francisco Nieves, as Trustee of the Gonzalez Coronado Trust, Individually and on Behalf of All Others Similarly Situated, Plaintiffs, v. Kevin Davis and Amir Rosenthal (Performance Sports Group Ltd.), Defendants, Case No.: 1:16-CV-3591-GHW, United States District Court for the Southern District of New York. Filed expert report on December 18, 2020. Deposition February 5, 2021. Filed expert rebuttal report on April 6, 2021. Filed declaration re: Plan of Allocation January 21, 2022.
- Testifying Expert in Mayuko Holwill, Individually and on Behalf of All Others Similarly Situated, Plaintiff, v. AbbVie Inc., Richard A. Gonzalez, and William J. Chase, Defendants, Case No. 1:18-cv-6790, United States District Court for the Northern District of Illinois. Filed expert report on February 1, 2021. Filed expert rebuttal report on September 20, 2021.

- Testifying Expert in Oklahoma Firefighters Pension and Retirement System, Individually and on Behalf of All Others Similarly Situated, Plaintiff, vs. Newell Brands Inc., Michael B. Polk, John K. Stipancich, Scott H. Garber, Bradford R. Turner, Michael T. Cowhig, Thomas E. Clarke, Kevin C. Conroy, Scott S. Cowen, Domenico De Sole, Cynthia A. Montgomery, Christopher D. O'Leary, Jose Ignacio Perez-Lizaur, Steven J. Strobel, Michael A. Todman, and Raymond G. Viault, Defendants, Case No: HUD-L-3492-18, Superior Court of New Jersey Law Division (Hudson County). Filed expert report on May 3, 2021. Filed expert rebuttal report on June 15, 2021. Deposition July 21, 2021. Filed expert supplemental reply report on February 4, 2022. Deposition March 15, 2022.
- Testifying Expert in Carmignac Gestion, S.A., Mason Capital L.P., et al., Pentwater Equity Opportunities Master Fund LTD., et al., First Manhattan Co., Nationwide Mutual Funds, on behalf of its series Nationwide S&P 500 Index Fund, et. al., WCM Alternatives: Event-Driven Fund, et al., Hudson Bay Master Fund LTD., et al., Schwab Capital Trust on behalf of its series Schwab S&P 500 Index Fund, et al., Sculptor Master Fund, LTD. f/k/a OZ Master Fund, Ltd., et al., Aberdeen Canada Funds – Global Equity Fund, a series of Aberdeen Canada Funds, et al., Discovery Global Citizens Master Fund, LTD., et al., York Capital Management, L.P., et al., Burlington Loan Management DAC, Universities Superannuation Scheme LTD., Principal Funds, Inc., et al., Kuwait Investment Authority et al., BlackRock Global Allocation Fund Inc., et al., Plaintiffs, vs. Perrigo Company PLC, et al, Defendants, Civil Action No(s): 17-10467 (MCA) (LDW), 18-1119 (MCA) (LDW), 18-1121 (MCA) (LDW), 18-2291 (MCA) (LDW), 18-15382 (MCA) (LDW), 18-16204 (MCA) (LDW), 18-16206 (MCA) (LDW), 19-3973 (MCA) (LDW), 19-4900 (MCA) (LDW), 19-6560 (MCA) (LDW), 19-21502 (MCA) (LDW), 19-21732 (MCA) (LDW), 20-1484 (MCA) (LDW), 20-2262 (MCA) (LDW), 20-2410 (MCA) (LDW), 20-3431 (MCA) (LDW), 20-4748 (MCA) (LDW), United States District Court for the District of New Jersey. Filed expert report on June 23, 2021. Filed expert report on September 29, 2021. Deposition October 26, 2021.
- Testifying Expert in In Re Nielsen Holdings PLC Securities Litigation, Case No. 18-CV-07143-JMF, United States District Court Southern District of New York. Filed expert report on July 14, 2021. Deposition September 30, 2021. Filed expert report December 17, 2021.
- Testifying Expert in Allegheny County Employees Retirement System et al. v. Energy Transfer LP et al., Case No. 2:20-cv-00200-GAM, United States District Court for the Eastern District of Pennsylvania. Filed expert report on September 17, 2021. Deposition November 18, 2021. Filed expert rebuttal report on April 22, 2022.
- Testifying Expert in Julia Junge and Richard Junge et al. v. Geron Corporation et al., Case No. 3:20-cv-00547-WHA, United States District Court for the Northern District of California, San Francisco Division. Filed expert report on September 30, 2021. Deposition October 15, 2021. Filed expert rebuttal report on November 4, 2021.
- Testifying Expert in In Re MINDBODY, Inc. Securities Litigation, Civil Action No. 1:19-cv-08331-VEC, United States District Court Southern District of New York. Filed expert report on October 15, 2021.

- Testifying Expert in Plymouth County Retirement System and Oklahoma Police Pension and Retirement System, Individually and On Behalf of All Others Similarly Situated, v. Evolent Health, Inc., Frank Williams, Nicholas McGrane, Seth Blackley, Christie Spencer, and Steven Wigginton, Case No. 1:19-cv-01031, United States District Court Eastern District of Virginia, Alexandria Division. Filed expert report on October 19, 2021. Filed expert report on April 8, 2022. Deposition May 9, 2022. Filed expert report on May 27, 2022. Deposition June 22, 2022.
- Testifying Expert in In re Uniti Group Inc. Securities Litigation, Case No. 4:19-cv-00756-BSM, United States District Court Eastern District of Arkansas, Central Division. Filed expert report on October 25, 2021. Deposition December 6, 2021. Filed declaration re: expert report on January 24, 2022. Filed expert rebuttal report on February 22, 2022.
- Testifying Expert in David Kanefsky, Individually and On Behalf of All Others Similarly Situated, v. Honeywell International Inc., Darius Adamczyk, and Thomas A. Szlosek, Civ. No. 2:18-15536-WJM, United States District Court for the District of New Jersey. Filed expert report on November 1, 2021.
- Testifying expert in In Re Pareteum Securities Litigation, No. 1:19-cv-09767-AKH-GWG, United States District Court for the Southern District of New York. Filed expert report December 1, 2021.
- Expert declaration in Arkansas Teacher Retirement System and John A. Prokop, Individually and on Behalf of All Others Similarly Situated, Plaintiffs, vs. OSI Systems, Inc., Deepak Chopra, Alan Edrick, and Ajay Mehra, Defendants, Case No. 17-cv-08841-VAP-SKx, United States District Court for the Central District of California, Western Division. Filed declaration re: Plan of Allocation and aggregate damages December 10, 2021.
- Testifying Expert in Boston Retirement System, Individually and On Behalf of All Others Similarly Situated v. Alexion Pharmaceuticals, Inc., Leonard Bell, David L. Hallal, Vikas Sinha, David Brennan, David J. Anderson, Ludwig Hantson, and Carsten Thiel, Defendants, Civ. No. 3:16-cv-2127(AWT), United States District Court for the District of Connecticut. Filed expert report December 15, 2021. Deposition March 8, 2022. Filed expert rebuttal report June 17, 2022.
- Testifying Expert In Re Aphria, Inc. Securities Litigation, No. 1:18-cv-11376-GBD, United States District Court Southern District of New York. Filed declaration January 28, 2022 re: class certification. Filed expert report January 28, 2022. Deposition May 19, 2022.
- Testifying Expert in Discovery Global Citizens Master Fund, Ltd., et al., MSD Torchlight Partners, L.P., et al., Incline Global Master LP., et al., Valic Company I, et al., Okumus Opportunistic Value Fund, Ltd., The Boeing Company Employee Retirement Plans Master Trust, et al., Första AP-Fonden, et al., GMO Trust, et al., Hound Partners Offshore Fund, LP, et al., Colonial First State Investments Limited As Responsible Entity For Commonwealth Global Shares Fund 1, et al., Bharat Ahuja, et al., Brahman Partners II, L.P., et al., The Prudential Insurance Company Of America, et al., 2012 Dynasty UC LLC, et al., BlackRock Global Allocation Fund, Inc., et al., Northwestern Mutual Life Insurance Co., et al., Bahaa Aly, et al., James M. Templeton, et al., GIC Private LTD., et al., USAA MUTUAL FUNDS TRUST On Behalf Of Its Series USAA Aggressive Growth Fund, et al., Maverick Select Fund, Ltd., et al., Plaintiffs, vs. Valeant Pharmaceuticals

International, Inc. et al., Defendants, Civil Action No(s): 3:16-cv-07321-MAS-LHG, 3:16-cv-07324-MAS-LHG, 3:16-cv-07494, 3:16-cv-07496, 3:17-cv-06513-MAS-LHG, 3:17-cv-07636-MAS-LHG, 3:17-cv-12088-MAS-LHG, 3:18-cv-00089, 3:18-cv-08705-MAS-LHG, 3:18-cv-00383-MAS-LHG, 3:18-cv-00846-MAS-LHG, 3:18-00893, 3:18-cv-01223-MAS-LHG, 3:18-cv-08595-MAS-LHG, 3:18-cv-00343-MAS-LHG, 3:18-cv-15286-MAS-LHG, 3:18-cv-17393, 3:20-cv-05478, 3:20-cv-07460-MAS-LHG, 3:20-cv-07462-MAS-LHG, 3:20-02190-MAS-LHG, United States District Court for the District of New Jersey. Filed expert report February 2, 2022. Filed expert rebuttal report on May 9, 2022. Deposition June 3, 2022. Filed declaration September 28, 2022 (related only to 3:20-cv-02190-MAS-LHG). Filed declaration November 10, 2022.

- Testifying Expert in Roei Azar, Individually and on Behalf of All Others Similarly Situated, Plaintiff, vs. Grubhub Inc., et al., Defendants, Case No. 1:19-cv-07665, United States District Court Northern District of Illinois Eastern Division. Filed expert report June 1, 2022. Deposition July 14, 2022.
- Testifying Expert in In Re Peabody Energy Corp. Securities Litigation, Civil Action No. 1:20-cv-08024-PKC, United States District Court Southern District of New York. Filed expert report July 15, 2022.
- Testifying Expert in BlackRock Asset Management Canada Limited, et al., Plaintiffs, v. Valeant Pharmaceuticals International, Inc. (n/k/a Bausch Health Companies Inc.), et al. Defendants, Nos.: 500-11-054155-185, 500-17-103749-183, and California State Teachers' Retirement System, Plaintiff, v. Bausch Health Companies Inc. (f/k/a Valeant Pharmaceuticals International, Inc.), et al., Defendants, Nos.: 500-11-055722-181, 500-11-055722-181, Canada Superior Court, Province of Québec, District of Montreal. Filed expert report September 30, 2022.
- Testifying Expert in Sheet Metal Workers National Pension Fund and International Brotherhood of Teamsters Local No. 710 Pension Fund, individually and as Lead Plaintiffs on behalf of all others similarly situated, and International Union of Operating Engineers Pension Fund of Eastern Pennsylvania and Delaware, individually and as Named Plaintiff, on behalf of all others similarly situated, Plaintiffs v. Bayer Aktiengesellschaft, Werner Baumann, Werner Wenning, Liam Condon, Johannes Dietsch, and Wolfgang Nickl, Defendants, No. 3:20-cv-04737-RS, Northern District of California, San Francisco Division. Filed expert report October 28, 2022. Deposition December 21, 2022.
- Testifying Expert in In Re: Maxar Technologies, Inc. Shareholder Litigation, Lead Case No.:19CV357070, Superior Court of the State of California, County of Santa Clara. Filed expert report December 12, 2022.

Experience in Labor Economics and Discrimination-Related Cases:

- Expert consultant for Cargill in class action race discrimination matter in which class certification was defeated.
- Expert consultant for 3M in class action age discrimination matter.

- Expert consultant for Wal-Mart in class action race discrimination matter.
- Expert consultant on various other significant confidential labor economics matters in which there were class action allegations related to race, age and gender.
- Expert consultant for large insurance company related to litigation and potential regulation resulting from the use of credit scores in the insurance underwriting process.

**Testimony:**

- Testifying expert in Shirley Cohens v. William Henderson, Postmaster General, C.A 1:00CV-1834 (TFH) United States Postal Service. United States District Court for the District of Columbia. – Filed report re: lost wages and benefits.
- Testifying expert in Richard Akins v. NCR Corporation. Before the American Arbitration Association – Filed report re: lost wages.
- Testifying expert in Maureen Moriarty v. Dyson, Inc., Case No. 09 CV 2777, United States District Court for the Northern District of Illinois, Eastern Division. Filed expert report October 12, 2011. Deposition November 10, 2011.
- Testifying expert in Vincent Torbio, et al. against Feldor Billiards Inc. D/B/A Fatcat Billiards, et al., Index No. 153384/14, Supreme Court of the State of New Your, County of New York. Filed expert report May 29, 2018. Deposition July 24, 2018.

Selected Experience in Antitrust, General Damages, and Other Matters:

- Expert consultant in high-profile antitrust matters in the computer and credit card industries.
- Expert consultant for plaintiffs in re: Brand Name Drugs Litigation. Responsible for managing, maintaining and analyzing data totaling over one billion records in one of the largest antitrust cases ever filed in the Federal Courts.
- Served as neutral expert for mediator (Judge Daniel Weinstein) in allocating a settlement in an antitrust matter.
- Expert consultant in Seminole County and Martin County absentee ballot litigation during disputed presidential election of 2000.
- Expert consultant for sub-prime lending institution to determine effect of alternative loan amortization and late fee policies on over 20,000 customers of a sub-prime lending institution. Case settled favorably at trial immediately after the testifying expert presented an analysis I developed showing fundamental flaws in opposing experts calculations.

### **TEACHING EXPERIENCE:**

KNOX COLLEGE, Teaching Assistant - Statistics, (1995)  
KNOX COLLEGE, Tutor in Mathematics, (1992 - 1993)

### **PUBLICATIONS:**

Coffman, Chad and Mary Gregson, "Railroad Construction and Land Value." *Journal of Real Estate and Finance*, 16:2, pp. 191-204 (1998).

Coffman, Chad, Tara O'Neil, and Brian Starr, Ed. Richard D. Kahlenberg, "An Empirical Analysis of the Impact of Legacy Preferences on Alumni Giving at Top Universities," *Affirmative Action for the Rich: Legacy Preferences in College Admissions*; pp. 101-121 (2010).

### **PROFESSIONAL AFFILIATIONS:**

Associate Member CFA Society of Chicago  
Associate Member CFA Institute  
Phi Beta Kappa

### **AWARDS:**

1994 Ford Fellowship Recipient for Summer Research.  
1993 Arnold Prize for Best Research Proposal.  
1995 Knox College Economics Department Award.

### **PERSONAL ACTIVITIES:**

- Pro bono consulting for Cook County State's Attorney's Office.
- Pro bono consulting for Cook County Health & Hospitals System – Developed method for hospital to assess real-time patient level costs to assist in improving care for Cook County residents and prepare for implementation of Affordable Care Act.
- Pro bono consulting for Chicago Park District to analyze economic impact of park district assets and assist in developing strategic framework for decision-making.